LAB NEWS
VOL. 39, NO. 17 SANDIA NATIONAL LABORATORIES AUGUST 28, 1987

***Weapon Program Awards***

# Ten Sandians Recognized for Outstanding Contributions

Nine SNLA employees received 1987 DOE Weapon Recognition for Excellence Awards from the Office of Military Application Wednesday. James Culpepper, Acting Director of Military Application, presented the awards during a ceremony at the Technology Transfer Center. A SNLL employee will receive a team award at Livermore next month.

The awards recognize outstanding contributions to the U.S. nuclear weapons program and are one of DOE's highest honors.

Sandians who received excellence awards are:

CARL PETERSON (1520), RANDY MAYDEW (1550), DON JOHNSON (DMTS, 1552), and HAL WIDDOWS (1552), *for development of high-performance parachutes for nuclear weapons.*

Sandia began its parachute R&D in 1953 to study the feasibility of laying down a nuclear bomb from an aircraft flying at low altitudes at transonic speeds (95 to 110 percent of the speed of sound — at sea level).

Since that time, parachute technologies developed at the Labs under the leadership of Carl, Randy, Don, and Hal have made Sandia the unofficial "Center of Excellence" in parachute technology in the U.S. Among them, the four award winners have some 112 years of Sandia parachute work experience.

Between 1957 and 1975, the Air Force and Sandia jointly designed parachutes for the B28, B43, B53, B57, and B61 laydown bombs. Since 1975 all nuclear weapon parachutes have been designed by Sandia.

Technology innovations pioneered at Sandia include the use of Kevlar to make heavy-duty parachutes lighter, but stronger, thus optimizing drag efficiency. The 46-ft.-diam. chute for the B83 can, for example, withstand an opening shock (drag load)

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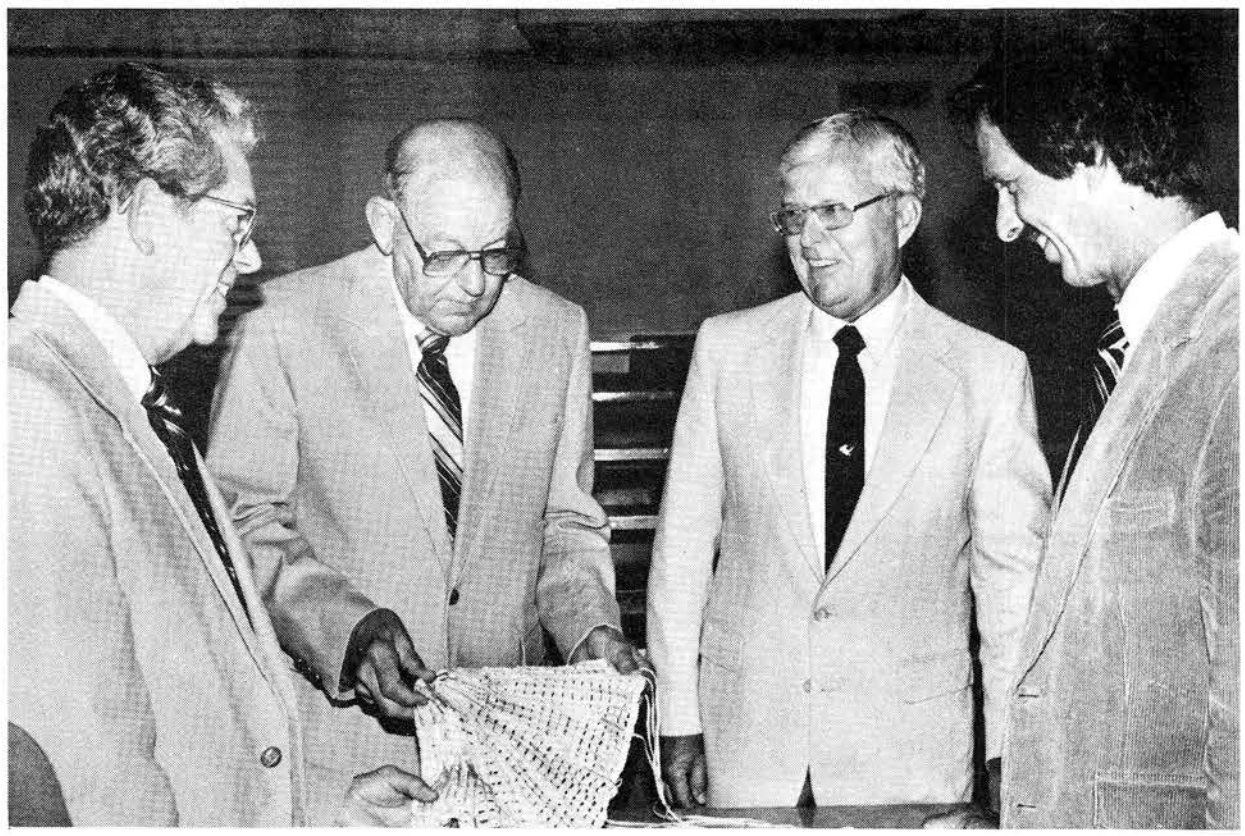
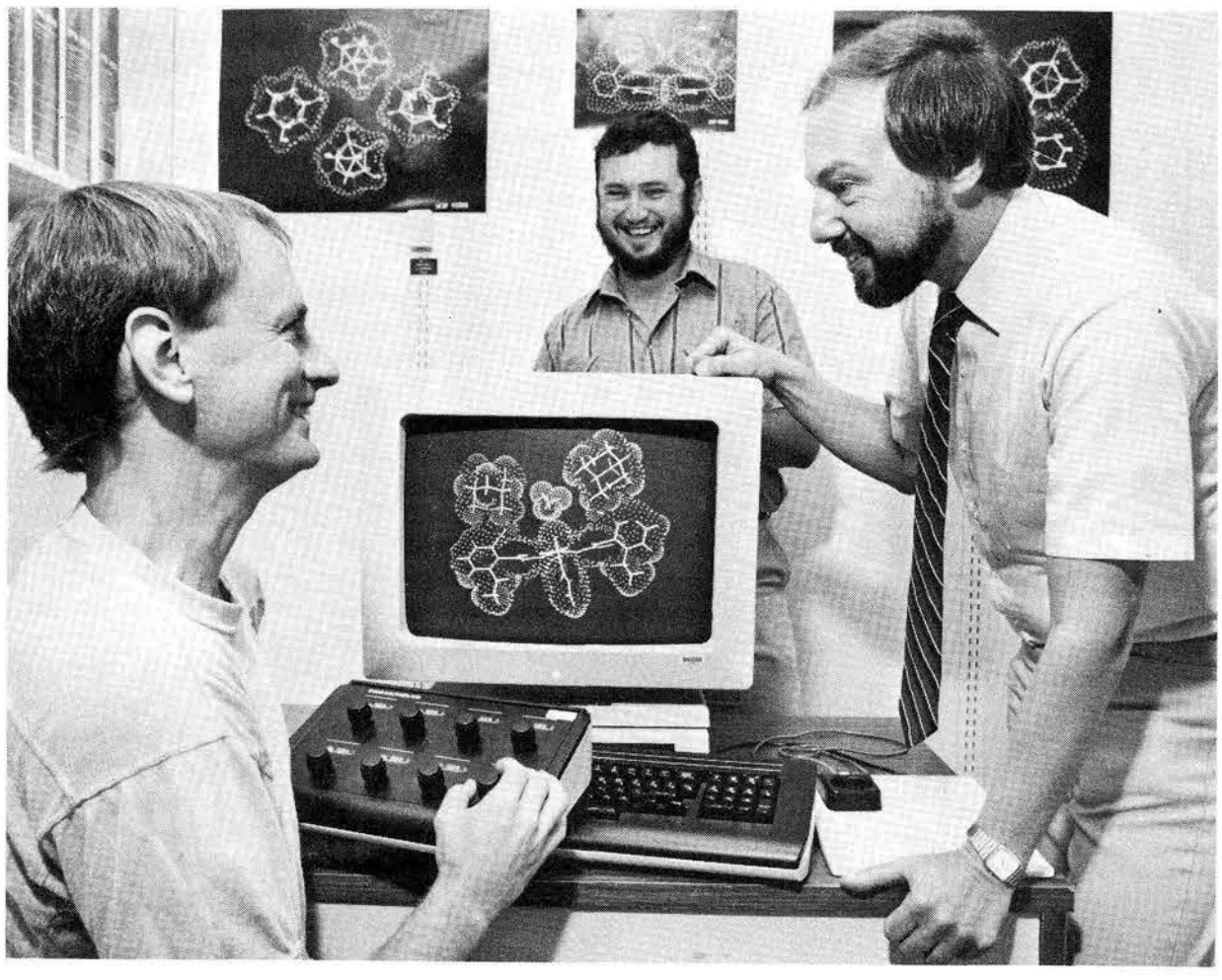


TOGETHER, THEY HAVE SOME 112 YEARS of parachute experience: (from left) Don Johnson (DMTS, 1552), Hal Widdows (1552), Randy Maydew (1550), and Carl Peterson (1520). They're displaying an 18-in.-diam. conical ribbon parachute similar to those used during wind tunnel tests to predict full-scale drop test results.

***Manipulating the Molecules***

# 'Designer Catalysts' May Be Direct Route to Methanol



SURROUNDING THE SCREEN showing the structure they hope to synthesize, John Shelnutt (left), Barry Granoff (right), and Carlos Quintana (all 6254) look forward to the challenge of creating tailor-made catalysts. The structure is a porphyrin modified to add corner lobes that have the right geometry to contain both the methane (the Mickey-Mouse-head-like molecule nesting between the top lobes) and the oxygen molecule on which it rests. Such a structure should react catalytically to form methanol directly from methane.

John Shelnutt of Process Research Division 6254 turns a control knob, and an intricate three-dimensional structure on the screen rotates. It could almost be the engineering drawings for a giant spaceship, perhaps Star Trek's intrepid Enterprise. Then, like a shuttle craft docking with its mother ship, a smaller unit descends from above, swings around, and nestles into a welcome-looking pocket in the center of the structure.

No, Sandia is not suddenly designing interstellar spacecraft. But the explorations going on here have an import for the future all their own.

The larger structure is a modified version of a porphyrin molecule, the active center of some very interesting enzymes (see "Computer Graphics" story). The smaller, mobile structure is a methane molecule. The docking interaction is a visual display produced in Sandia's new computer-aided molecular modeling facility. And the molecular design capability is, in turn, just one part of an ambitious new Sandia program.

Its goal? To tailor-make catalysts for the direct conversion of methane to methanol. A Sandia team is attempting to mimic the activity of biological enzymes that catalyze the oxidation of alkanes, such as methane, to alcohols.

(Catalysts are substances that enable a chemical reaction to take place at milder temperatures and pressures than would otherwise be the case. That is, they facilitate a reaction, provide a lower-energy path to the desired product. They also provide selectivity, the ability to achieve a slate of desired products.)

John is using techniques such as Raman spectroscopy to understand the structure of existing cat-

*(Continued on Page Two)*

# Antojitos

Tall Oaks from Tiny Acorns Dept. Dick Claassen shared with LAB NEWS a letter he received after his "farewell, Dick" story in the July 2 issue: "As a high school sophomore I attended the Science Seminar series at the 1963 Science Fair, and I regard it as one of the most influential events in my life. It was there that I decided to become a physicist and began to understand what science is. The inspiration I picked up there, especially from a personal interaction with Edward Teller, kept me going over some rough spots in my physics education until physics became fun.

"As a student, I never thought about all the work required to organize that series. I didn't appreciate your behind-the-scenes work then, but I appreciate it now." The letter-writer? Clyde Layne (8151).

* * *

Gus Is Great! Gus Simmons (Senior Fellow, 200) is recovering twice as fast as predicted from a July 16 auto accident at the North 14/Old 66 intersection. But that doesn't mean he'll be back at Sandia immediately -- he should be out of St. Joe's Rehab Center in a few days, but then he'll spend 12 weeks learning to walk again, this time with a metal hip joint.

"I attribute my speedier-than-predicted recovery to good care, good health, good luck, and determination," he says. "And to the cards, calls, and visits -- I think I've heard from everyone I've ever worked with. And I really appreciate it. I'd never known how much it could matter."

The broadside accident pushed in the driver's side of Gus's car 1.5 feet, bulged the right side out 6 inches, and propelled Gus (who was wearing his seat belt) out of his shoes and into the passenger position. "The best place to have an accident is, of course, in front of an emergency room," Gus notes. "The second-best place is in front of an empty ambulance. That's what I did -- the District 6 rescue vehicle happened to be waiting at a stop sign at the intersection, so I had immediate medical attention and witnesses to the accident."

Gus hopes to be back at Sandia, part-time and on crutches, in six weeks or so. But he's back at work already -- he's finished one major paper and he's now editing two others. "I didn't get hit in the head," he points out.

Gus is lucky to be alive, and he knows it: "From here on out, everything's an encore."

* * *

Looks Like Grammer, Don't It, Zeb? Orval Jones (20) and I share few of the same burdens. But a couple of his pet peeves, when it comes to written communications, bother me too. To wit: Don't use "lead" for "led" (the past tense of "lead") and don't put a "ta" in front of "tive" syllables at the ends of words.

You and I know better, of course, but it seems some of our fellow workers falter frequently. Today's lesson: Use "led" in such past tense contructions as "I have led my horse into water, but I cannot make him shrink." Yes, there's a word "lead" that rhymes with "bed" and "led," but -- this is heavy stuff -- it's an element, not a verb.

Now to the "ta" problem. It's "preventive," not "preventative." And it's "interpretive," not "interpretative." For now, ta-ta. •BH

* * *

Poco a poco se anda lejos. (Little by little you walk a long way, or, "slow but sure.")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**When Breathing Gets Boring**

The current issue of *Life Sciences* contains a paper under the title: "Alternating lateralisation of plasma catecholamines and nasal patency in humans." Our science editor says this means "why you can breathe up one nostril at a time."

*New Scientist*

*(Continued from Page One)*

# Catalysts

alysts. This knowledge will then be combined with computer-aided molecular design techniques to guide the synthesis of novel catalytic materials.

"It's this cycle that's so exciting," says John. "We characterize the essence of the catalytic structure, use computer modeling to design a molecule that's never before existed, synthesize it in the laboratory, then test it — how well does it work? Then, if necessary, we redesign it and repeat the process.

"In other words, we're developing the capability to use this feedback loop to build *any* catalyst, for *any* application," John continues. "If we succeed, the potential is enormous. It would mean we could build the binding sites — pockets, if you will — for any number of catalytic molecules tailored to a given application."

"We certainly are excited about this project," says Barry Granoff, 6254 supervisor and leader of the group, which includes John, Fran Stohl, Dan Trudell, and Carlos Quintana. "We're trying to make what you might call 'designer catalysts.' "

### Methane → Methanol Directly

The immediate stake is nothing less than creation of a direct route from methane to liquid fuels. Given the United States' continuing dependence on foreign oil (42 percent of our oil now comes from foreign sources, up from 27 percent in 1985), it is necessary to find new sources of liquid fuel. Natural gas is now abundant — Barry refers to the so-called "natural gas bubble," the current excess on the North Slope and elsewhere — and natural gas contains about 90 percent methane.

"If natural gas could be converted to liquids right at the wellhead and transported via existing pipelines, it could be very important to industry and transportation," says Barry. The trick is to convert methane (a gas) to methanol (a liquid) and do it directly, that is, *without* going through the complex, steam-driven "reforming" process (in which hydrogen and carbon monoxide are created first as an intermediate product). Such a direct route has recently become especially attractive because once you have methanol, you can use existing technology to convert it directly to gasoline.

"Obviously, it's more efficient to go directly from methane to methanol," says Fran, who'll be giving one of the first two public papers on the Sandia program at the American Chemical Society meeting in New Orleans, Aug. 30-Sept.4. The other paper, to be presented by John, deals with some of his early findings in using Raman spectroscopy for methane synthesis.

For a direct methane-to-methanol reaction, a methane molecule ($CH_4$) has to be somehow held in place by a catalyst in such a way that it can combine with an oxygen molecule, also attracted to the

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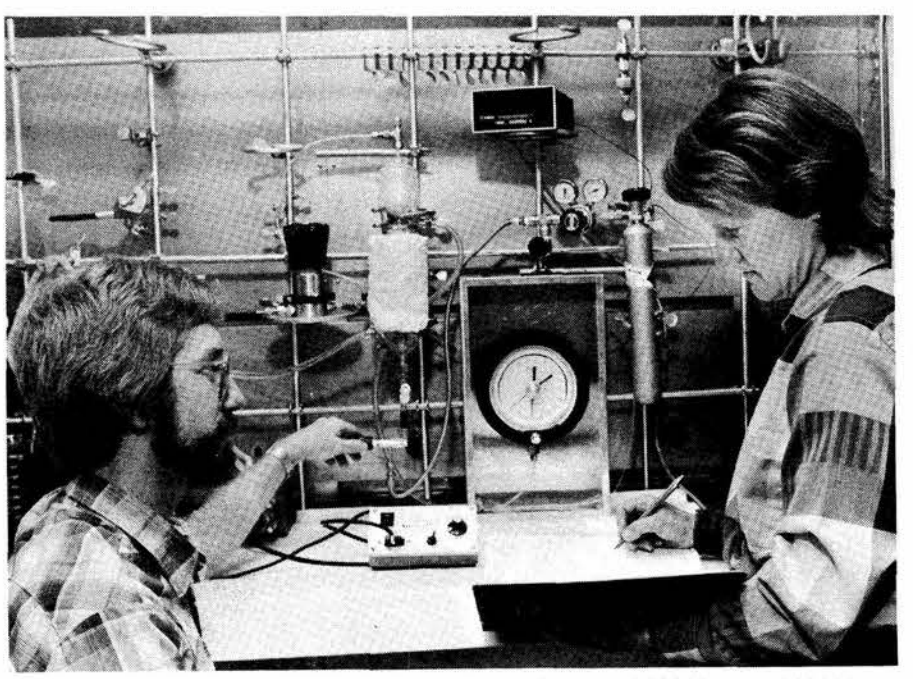


IN THE CHEMISTRY LAB, Dan Trudell and Fran Stohl (both 6254) discuss the creation (synthesis) of new catalysts and the tests needed to determine their reactivity.

(Continued from Preceding Page)



# Catalysts

same site. Methyl alcohol ($CH_3OH$), that is, methanol, is the result.

The Sandia program is specific in intent but broad in approach. Using enzymes as model systems and making use of the computer-aided molecular graphics, the group plans to design, characterize, synthesize, and test new kinds of catalysts (see "Methane" story).

### New, But Appropriate, Role

"It's a new role for us," says Barry. But he points out that it's one Sandia can handle readily: "We have all the wherewithal necessary to do this," he says, "including the equipment (such as sophisticated microreactors to test the catalysts) and the expertise in catalyst research. We also have a great base of experience in exploratory catalysis and reaction kinetics.

"And it's an appropriate role for a national lab," emphasizes Barry, who originally proposed the program about two years ago. "All the experts believe the petroleum glut is temporary. The Labs' central purpose is national security, and energy is a key feature of that security." In addition, even the non-experts have come to realize that fluctuations in vulnerable energy supplies affect the economy. "So it's important that we get some options," says Barry. "And this is a neat one."

DOE agrees. Its Advanced Research & Technology Development program in the Division of Fossil Energy at DOE Headquarters and at DOE's Pittsburgh Energy Technology Center is supporting the program.

"I'm very excited about this project," says Dan Hartley (6000). "It's ideal for the Labs — innovative, requires science *and* engineering, and can have a real impact on the nation's energy future."

All the work done so far is just the start. Months and years of detailed work lie ahead. But the shining goal, way off there in the distance, nevertheless looms attractively large and significant. "There's a tremendous need to find a direct route for converting natural gas to liquid fuel," says Barry.

The task, he realizes, is full of challenges and opportunities — technological, intellectual, and commercial. In fact, if the Sandia effort is at all successful, says Barry, direct involvement with industry should naturally follow. In fact, a relationship with the Gas Research Insitute has already been established. "If it works, we want to get a cooperative venture with chemical and oil companies."

The subject is already of intense worldwide interest, Barry says. "There really is a race — a methane-activation race."

But, shifting metaphor, he concludes: "Here at Sandia, we're able to do just about every piece of the puzzle." •Ken Frazier (3161)

***Promising Results Already***

## Methane, the Toughest Alkane to Activate

The tests of catalyst activity and selectivity are an essential part of the task. The group is developing the tests, then trying them out. They're the main subject of the paper Fran Stohl (6254) is giving in New Orleans.

Here we're no longer talking about slick computer graphics. The setting is the chemistry lab.

The goal of all this, remember, is to determine how well the proposed catalysts function to convert alkanes — methane being the simplest alkane — to alcohols, such as methanol. The effectiveness is measured as a percentage yield — what percentage of the initial alkane added to the reaction is converted to alcohol. The catalyst is said to "activate" the reactant — causing it to react with oxygen — and the reaction is known as alkane activation.

Team members began by testing several commercially available porphyrins. They started with a test of cyclohexane ($C_6H_{12}$, in a ring) using previously reported conditions so that their results could be compared to results published in the literature. Then they developed several different activity tests using alkanes of varying chain lengths.

They will work their way down to methane later; it's likely to be the toughest to activate because its single carbon atom does not bond with other carbon atoms so it holds its four hydrogen atoms especially tight.

The catalysts used included iron tetraphenyl porphyrin (FeTPPCl), manganese tetraphenyl porphyrin (MnTPPCl) and iron pentafluorophenyl porphyrin ($FeTF_5PPCl$). The source of the oxygen for most of these studies was an oxidant called iodosylbenzene.

Various combinations of reactant, oxidant, and catalyst were reacted together in laboratory apparatus. Cyclohexane, hexane ($C_6H_{14}$), and butane ($C_4H_{10}$) are the alkanes that have been studied. Oxidation products were identified and quantified using gas chromatography and mass spectrometry.

Yields of alcohols obtained with cyclohexane ranged from 14 percent (when FeTPPCl was the catalyst) to 84 percent ($FeTF_5PPCl$ as catalyst). With the other reactants the only catalyst tested was $FeTF_5PPCl$. The yields were 56 percent for hexane and 35 percent for butane. Direct comparisons are difficult because different concentrations and temperatures were used. Future tests will allow comparisons.

According to Fran, these kinds of tests are yielding useful lessons and challenges. In any event, the results with butane suggest, she says, that they may have a good test procedure for use with shorter chain alkanes.

***Putting Pockets in Molecules***

## Computer Graphics Allow Molecule Manipulation

Porphyrin molecules, like the modified version on John Shelnutt's (6254) computer screen, are a main focus of the group's attention. These are an important and very common class of large-molecule organic compounds. Porphyrins (pronounced "POR-fuh-rins"), for example, form the active nucleus of chlorophylls (catalysts for photosynthesis) and of hemoglobin (the oxygen-carrying molecule of red blood cells).

"Porphyrin-like molecules exist widely in nature and facilitate a number of fascinating reactions," says Barry Granoff (6254). "They are an extremely important chemical group."

Porphyrins, specifically metalloporphyrins, were obvious candidates for the division's research program. They are present in enzymes such as methyl reductase and methyl transferase, which are involved in "$C_1$" (based on a source that contains a single carbon atom) chemistry. They have versatile structures that can be controlled. They can be synthesized with many different metals (a metal serves as the oxygen-gripping "active site" in these molecules). And they have shown significant potential for oxidizing long-chain alkanes so they may be useful in oxidizing short-chain alkanes such as methane.

John's idea is to mimic the iron/porphyrin-containing enzyme cytochrome P-450, which converts alkanes to alcohols in the liver. This protein has a rigid "pocket" that binds the alkane. That's necessary because porphyrins themselves are relatively two-dimensional. But they can be modified by adding large corner lobes that protrude out of the plane of the molecule and become pockets. Carboranes, which contain both carbon and boron, show some promise here. The carborane lobes create a pocket for the methane molecule that models the known structure of the cytochrome P-450 active site. The goal is to learn how to make a molecule with a nest-like pocket that can best hold a methane molecule in place.

The pocket will have to be just the right size for a methane molecule. It'll also have to have the right chemical characteristics.

### Small-Molecule Docking

That's where Sandia's new capability in computer-aided molecular graphics comes in.

"We're doing small-molecule docking," says Barry. "We're looking at small-molecule interactions." The shuttle-craft-docking-with-mother-ship analogy is not too far off.

The team's molecular graphics system consists of an Evans and Sutherland PS390 graphics system and a MicroVAX computer with Biograf molecular graphics software (from Biodesign Inc.). Both off-the-shelf (from a databank) or hypothetical molecules of virtually any complexity can be displayed in all their structural and color-coded splendor for the edification and enlightenment of the team members.

The resolution of the molecular structures displayed is very high. The detail is fine, nothing at all like the fairly crude graphics so often seen in graphics displays. And the molecules can be readily manipulated — rotated, turned, translated — along any axis.

Recently received software will allow the Sandians to do energy-minimization studies on promising molecular structures, a necessary step in determining their practicality as desired new catalysts.

The graphics are a marvelous tool, in Barry's view. "Molecular graphics is a really convenient way to look at the chemistry," says Barry. "These are extremely high-resolution graphics. When we rotate a molecule of interest, we might get an unexpected view. For example, along some particular line of sight, we might see a cleft that could serve as a site for a reaction.

"The graphics capability should let us accomplish in days studies that would otherwise take months.

"We need to design catalysts with the requisite spatial and electronic characteristics," Barry continues. "We need to ensure that methane will fit in the pocket and also that the oxidant will locate there at just the right time." He refers to the task as "designing active sites almost from first principles." Later, he says, "we intend to build, test, and obtain feedback about them, then improve them."

***(Continued from Page One)***

# Award Winners

of 210,000 lbs.

Sandia-developed codes, unavailable elsewhere, predict parachute inflation, deceleration forces, bomb/parachute trajectories, and stresses in parachute canopy materials. Labs parachute technologies have also been applied to designs of recovery systems for the W79 and W82 nuclear shells, recovery of Sandia sounding rocket payloads (200 flights), and recovery of reentry vehicles.

Sandia recently designed and developed a parachute system for the Sea Lance nuclear depth bomb that can withstand deployment at velocities as high as Mach 2 (see LAB NEWS, Aug. 29, 1986). Current reimbursable projects include parachutes for air-delivered cargo systems for the Army and a redesign of the F/FB111 crew escape module parachute system for the Air Force.

"Because our parachute experience and capabilities are unique, we often take on parachute work that can't be done elsewhere," says Randy. "We're proud of that."

That pride is not ill-founded. Frequent requests for help from agencies such as NASA and DoD provide the evidence.

CHUCK WILLIAMS (2344), *for sophisticated methods of analysis and prediction of radar fuze performance*.

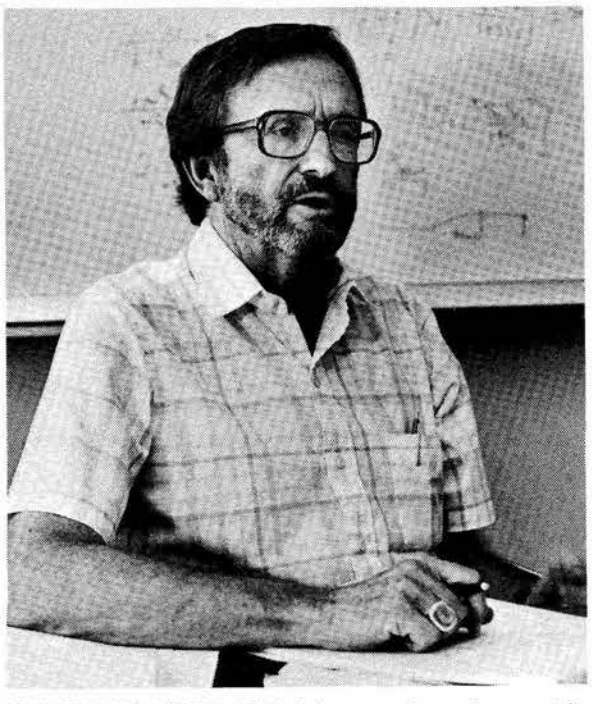
Chuck has made major contributions to the design, analysis, and understanding of every radar fuze designed by Sandia for the past 30 years, including fuzes for the B28, B43, B57, B61, W68, W76, B83, and W88.

He's developed increasingly sophisticated methods for predicting the performance of radar fuzes under actual operational conditions. These methods provided a sound theoretical basis for radar fuze design, reduced the amount of flight testing required, and led to specific design contributions that have improved radar performance.

Chuck, supervisor of Signal Analysis Div. 2344, says computers have made a tremendous difference in the radar analysis business. "The theories aren't much different," he says, "but we can turn out the numbers much more rapidly. That makes our analysis work much more useful for the hardware people."

Radar design depends on both understanding of radar operation and the way radar is affected by its external environment (trajectory, terrain reflectivity, plasma sheath, and weather and countermeasures effects).

Chuck developed techniques for modeling the signal-processing characteristics and statistical properties of every part of each radar and its antenna system, and combined them with detailed physical models of the external environment. His models of terrain reflectivity and plasma loss characteristics, especially, now constitute a unique national resource for radar fuze performance analysis.



CHUCK WILLIAMS (2344) has made major contributions to the design, analysis, and understanding of every radar fuze designed by Sandia for the past 30 years.

Chuck has also worked on electronic design of radar fuzes throughout his career. Working with radar circuit designers, he's analyzed the performance of each radar subassembly as well as the complete radar system and helped provide solutions when design deficiencies were identified.

One of his recent studies revealed a deficiency in the Trident-II radar fuze that was subsequently corrected. Early identification of the Trident problem resulted in significant cost savings and preserved the system's production schedule.

ANDY LIEBER (5220), *for contributions to safety, security, and survivability of nuclear weapons*.

The "Forward Look" study (see LAB NEWS, June 19, 1987), prepared in the late 70s at the request of DoD, documents many of Andy's significant contributions toward improving the safety, security, and survivability (SSS) of theater nuclear weapons deployed in NATO countries.

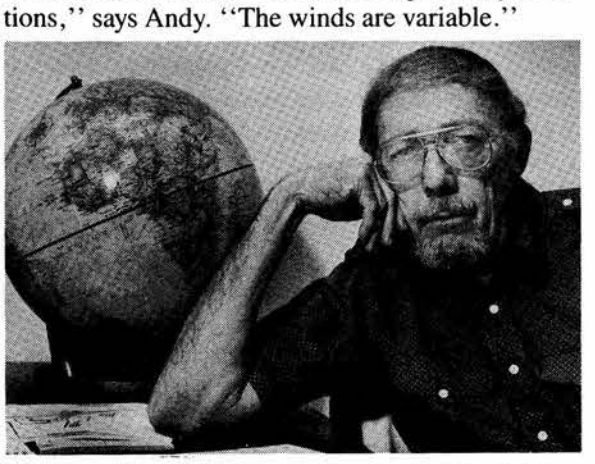
Andy oversaw the writing of 29 reports for "Forward Look," which did just that: looked ahead at possible SSS problems in the 80s — especially those related to the storage and transport of weapons.

The study, with its suggested "fixes" to some predicted shortfalls, is considered to be a primary source document in this subject area. Many of its concepts have been adopted, or work is proceeding on variations of some of the ideas presented.

Two Sandia developments presented in "Forward Look" — WADS (Weapons Access Denial System) and an improved weapon storage vault — have been adopted for use by NATO.

During his more than 35 years at Sandia, Andy has contributed many ideas for tackling problems and deficiencies associated with SSS. Both Nuclear Weapons Complex and DoD developers frequently look to him for advice in solving problems in this field.

Currently, he's managing a follow-up study ("Future Look") that's exploring security and survivability concepts appropriate for the 21st century. "Right now, because of the Geneva negotiations, our 'Future Look' weather vane is moving in many directions," says Andy. "The winds are variable."



ANDY LIEBER (5220), sometimes called the "Father of 'Forward Look,' " ponders "Future Look," a follow-up study that's exploring security and survivability concepts appropriate for the next century.

TED SCHMIDT (6450), *for development of pulsed reactor uses for nuclear warhead vulnerability tests*.

In 1976, Ted pioneered the use of Sandia's pulsed reactors to test neutron vulnerability of fissile weapon components.

His first work used the Sandia Pulse Reactor (SPR-II) for pulsed irradiation studies on nuclear components in support of LANL design efforts. These early SPR experiments examined gap formation, bond strengths, and joint integrity of the components.

Ted also performed the first exposure of a complete fissile unit on the SPR-II to examine thermomechanical effects of rapid differential heating in the material.

He also demonstrated — during the initial series of tests on warhead components in the Annular Core Pulse Reactor (ACPR) — that ACPR could be used to test full-size fissile components to Stockpile-to-Target Sequence (STS) hardness levels and beyond. STS specifications, determined by DoD, spell out requirements that a weapon must meet.

The 1976 experiments led to more sophisticated tests now conducted on the Annular Core Research Reactor, a replacement for ACPR. "We're proud of the fact that ACRR is now the only above-ground test facility used for certification of nuclear components developed by LANL and LLNL," says Ted. "That capability has resulted in significant cost savings and increased effectiveness when the components are exposed during underground testing.

"Our pulse reactor work on weapon components was a tremendous team effort," Ted continues. "Staff people from Departments 6420 and 6450 contributed throughout the program, as did people from LANL and LLNL. And the group responsible for reactor operations did an outstanding job.

"I'm grateful for the opportunity to work on important problems and to see them pay off such as this one did," Ted concludes.

TED SCHMIDT (6450) pioneered the use of Sandia's pulsed reactors to test neutron vulnerability of fissile weapon components. Here, he's shown at the Annular Core Research Reactor — the only above-ground test facility used for certification of nuclear components developed by LANL and LLNL.

HERMAN MAUNEY (7200), *for contributions to development and stockpile system evaluations of nuclear weapons*.

During his 34 years in the weapons program, Herman has made major contributions in the areas of weapon development, weapon stockpile system evaluation, and safeguards applications.

Herman worked on development of warheads for the B5, W35, W49, W76, and W78. He managed the W76/Mk4 Trident I warhead program from warhead development through transition to production; the strategic system was produced on schedule and within budget. Herman's efforts produced similar results with the W78/Mk12A improved Minuteman III program.

He also worked on advanced electrical systems, weapon feasibility studies, weapon handling and evaluation techniques, and the initial justification of the modern strategic bomb.

For seven years he was involved in safeguards and security activities (5200). Among his responsibilities in that area were an Air Force security upgrade program, DOE Office of Safeguards and Security (OSS) programs, and upgrades of DoD facilities in Europe and DOE facilities in the U.S. (Hanford and Rocky Flats).

Since March 1984 Herman has managed systems evaluation of the nuclear weapon stockpile. "During that time," says Herman, "we've re-examined the stockpile evaluation program with the goal of enhancing its strong points and modifying — or eliminating — factors that make the program less effective.

"Our main goal is to maintain quality and reliability in the stockpile; this country's deterrent capabilities depend on that."

Herman's suggestions on stockpile systems evaluation have resulted in other changes too: in-depth analysis of identified defects and more realistic test-

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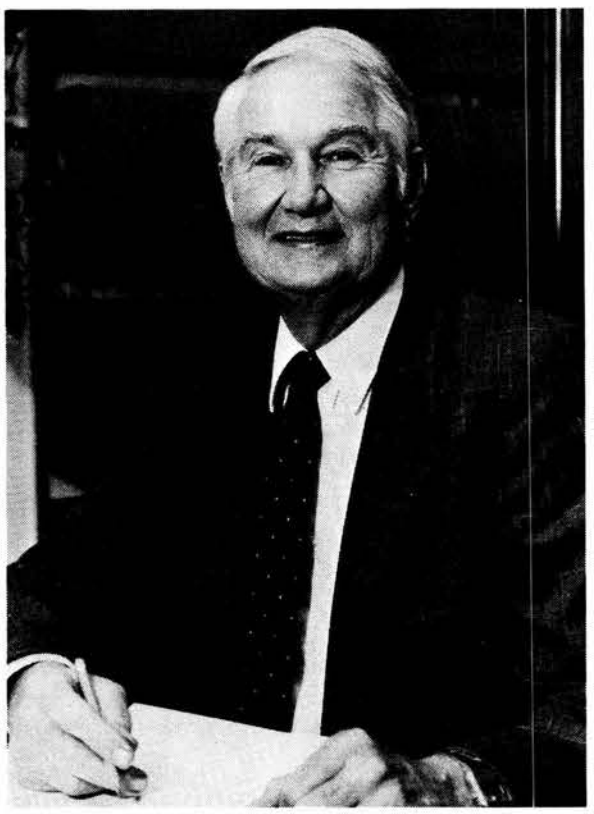

HERMAN MAUNEY (7200) has managed systems evaluation of the nuclear weapon stockpile since 1984. He says, "Our main goal is to maintain quality and reliability in the stockpile; this country's deterrent capabilities depend on that."

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# Award Winners

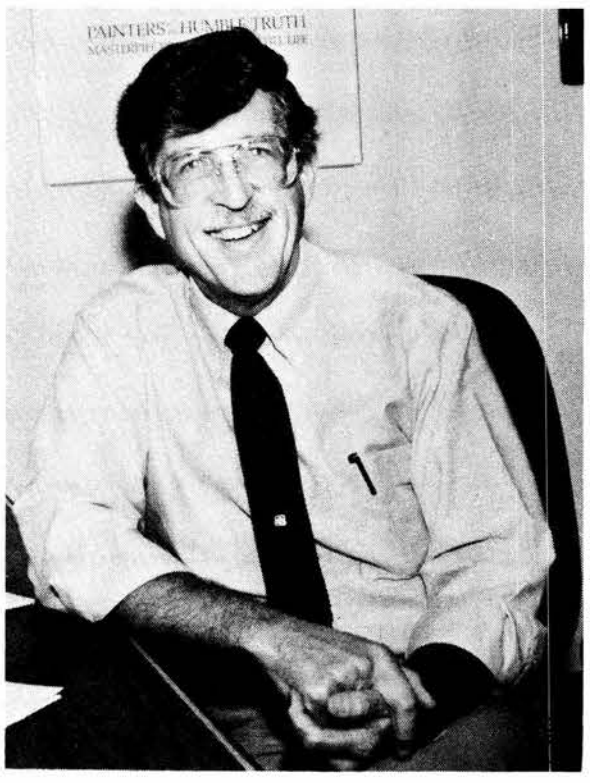
ing methods. Also, DoD and DOE have accepted an unclassified test configuration of a weapon — for use by NATO in Europe — that permits realistic weapon evaluation, but reduces security risks during testing.

JAY GILSON (8130), *for the W87 team, which met difficult objectives on time and within budget.*

With a one-year-less-than-normal interval between development and production, the W87 Peacekeeper nuclear warhead achieved Initial Operational Capability (IOC) on schedule and with greater DOE production lead time than any warhead program of recent times.

As manager of the department that had the W87 project, Jay coordinated activities for the program. But, he's quick to point out, "This was a team achievement; you might call me the cheerleader. Of all the organizations I've ever worked with, Sandia can put a [Labs-wide] team together better than anyone else."

W87 designs met all DoD requirements and were later shown to be routinely manufacturable. The Sandia development team evaluated those designs in a program involving ground, flight, and underground test effects; the evaluation effort was completed before IOC — something that hasn't been done in some time.



JAY GILSON (8130), who will accept the W87 team award next month at Livermore, says the W87 effort was an example of some of the finest teamwork he's ever seen.

With design team assistance, the DOE Production Agencies accelerated to a high production rate on the W87 in a historically short time. The W87 program began at a time when three other warhead programs were nearing production and Labs resources were scarce. The program required extra effort to accommodate necessary Air Force changes to the weapon's basing mode, fuze design, and reentry vehicle hardware.

Given those less-than-optimum conditions, the W87 program represents a milestone in cooperation between the design teams and the production complex. "The military world sees Sandia as an outfit with very capable 'teamsmanship,' " says Jay. "I think the W87 effort enhanced that image."

As of Sept. 1, Jay takes on a different assignment; he'll head for Washington, D.C., to work for a couple of years in the office of Bob Barker, Assistant To the Secretary of Defense for Atomic Energy. But he'll be back to collect that award!

## Earlier Excellence Award Winners

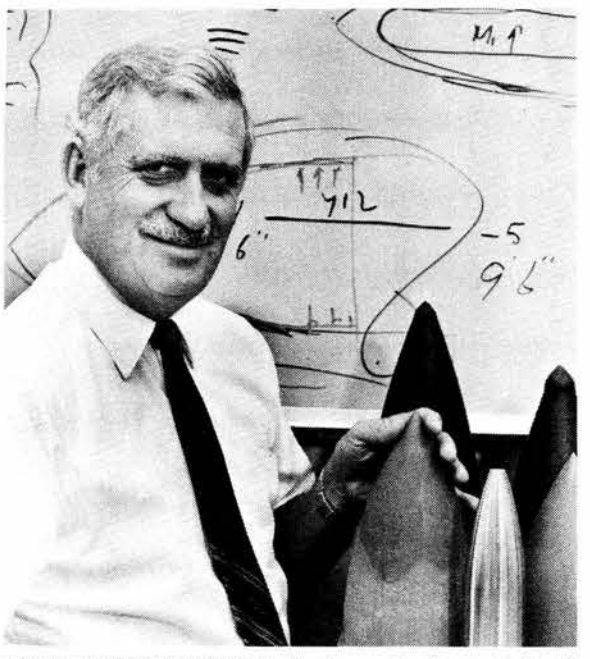
**1982** Jack Marron (2532), Jim Craig, Dick Damerow (2561), Ed Kjeldgaard (6321), Dick Brodie (DMTS, 400), Harold Vaughn (ret.), Al Hodapp (DMTS, 1551), Bob Thompson (1420), Larry Bertholf (2600), Ruth Whan (1820), Tom Massis (2515), Don Sharp (1831), and Fred Villa (2512).

**1983** Stan Spray (7232), Bob Graham (DMTS, 1131), Dan Tichenor (8431), Ken Henry (8444), Wilbur Jorgenson (8434), Tom Martin (1250), Ken Prestwich (1240), and Bill Chambers (1822).

**1984** Vic Roh (ret.), Peter Rand (1813), Rod Quinn, Jim Searcy (2523), Arlen Baldwin (2523), Jim Jorgensen, Wayne Corbett (2114), Won Kim, Keith Treece (DMTS, 2115), Tom Mnich, Rich Anderson (2142), Doug Weaver (2130), Ron Light (2131), Terry Nordstrom, Fred Sexton (2142), Frank Nielsen, Bill Sundt, Ed Williams (DMTS, 8153), Curt Franklin, and Russ Miller (8154).

**1985** Bill Stevens (ret.), Bob Luna (6321), Paul Longmire (2360), Steve Burchett (1521), Gordon Boettcher (DMTS, 2565), Cook Story (8165), and Morris Mote (DMTS, 8316).

**1986** Gus Simmons (Senior Fellow, 200), Bob Moyer (DMTS, 7242), Ray Alls (2341), Walt Dalby (5112), John Sharp (2812), Randy Harrison (2811), Ben Benedetti (8241), Dick Jorgensen (5113), and Don McCoy (5111).



WAYNE YOUNG (9122) displays plastic models of penetrator noses; the models were molded from actual noses used in earth penetration tests. Wayne's internationally recognized as an expert in earth-penetrating weapon systems.

WAYNE YOUNG (9122), *for pioneering efforts in earth penetration technology for weapon systems.*

Sandia began a program in the early 60s to develop technology for an earth-penetrating weapon (EPW). The term "terradynamics" was used to describe this combined experimental and analytical program; Wayne's been involved with it since 1965.

He has been project leader on many successful programs involving earth penetration systems and has been part of a continuing experimental effort to extend terradynamics technology.

The technology was — and continues to be — used in several Phase 1 weapon activities. It's also played a key role in the development of the Pershing II, the first Phase 3 EPW. Currently, both SNLA and SNLL have active Phase 1/2 EPW programs.

Terradynamics technology has also been used in many non-nuclear programs such as air-dropped battlefield sensors, sea ice penetrators for the Coast Guard and Navy, hard-target penetrating weapons for the Navy and Air Force, and comet and planet penetrators for NASA.

"One of the most interesting things about earth penetrator work is the variety of projects," says Wayne. "The same principles are involved, but each presents its own unique set of problems."

Wayne has developed analytical techniques — ranging from empirical equations to computer codes — for predicting penetration in all types of natural geology; his findings are used throughout the technical community. He's internationally recognized as an expert in earth penetrating weapon systems, and has published more than 50 papers on terradyamics-related activities.

Currently, Wayne's continuing his terradynamics development work and serves as a consultant on earth penetration technology not only within Sandia, but at other DOE, DoD, and NASA laboratories. •PW

# Fun & Games

*Biking* — Gather up the family, hop on your bikes, and join the Second Annual Chamber Orchestra of Albuquerque Turquoise Trail Tour on Sept. 20. The 70-mile tour to Madrid and back (or any portion thereof depending on ability or inclination) starts and finishes at the Four Hills Village Shopping Center (Central & Tramway). Start time is 8 a.m.; check-in tables open at 7 a.m. Rest stops providing refreshments and sag wagons will be available. Register early to be eligible for prizes. Pick up forms in the LAB NEWS office (Bldg. 814).

* * *

*Golf* — The Fifth Annual Hispanic Scholarship Golf Tournament tees off Sept. 14 at the Tijeras Arroyo Golf Course at KAFB. Proceeds from this year's tournament will be presented to the Mexican-American Women's National Association for its scholarship program. Entry deadline is Sept. 9; fee is $35 and includes golf, refreshments, and awards. For more information, contact Alonzo Florez on 4-7690.

* * *

*Shooting* — Sharpen gun-handling skills with the Rio Grande Practical Shooting Club. Informal matches sanctioned by the U.S. Practical Shooting Association are held the first and third Saturday of each month at the State Shooting Range Park (West Mesa). Beginners are given training in range safety procedures and rules for matches, including simulated self-defense situations where the competitor shoots various targets from behind barricades or through doorways. For membership information, contact Larry Costin (6314) on 6-0488 or Bill Olsson (6232) on 4-7344.

* * *

*Amusement* — Enjoy an evening of family fun and food at Uncle Cliff's on Sept. 9 from 6 to 9 p.m. Proceeds benefit maternity and family support programs at Family and Children's Services, Inc. (United Way agency). Admission is $6/person for unlimited rides. For tickets, call Linda Vigil-Lopez (3510) on 4-6281 or Ron Hartwig (5155) on 4-8846.

# New Penetrator Proves Successful

Sandia engineers have come up with a new design for a water and ice penetrator that offers greatly improved performance at reduced cost.

The use of a pointed penetrator for water entry is something of a departure from the more traditional blunt body. Existing water entry bodies have blunt nose shapes that create a "cavity" when the missile enters the water. The new pointed nose, on the other hand, becomes fully wetted over most of its surface upon entering.

"The pointed nose means we can go in at much higher speeds — more than three times as fast, in many cases — with no increase in the load the penetrator experiences on impact," says Jack Swearengen, supervisor of Advanced Systems Division 8152. "A capability for high-speed water entry will allow us to eliminate a retardation system usually needed for blunt water re-entry bodies, and thus reduce their cost and complexity.

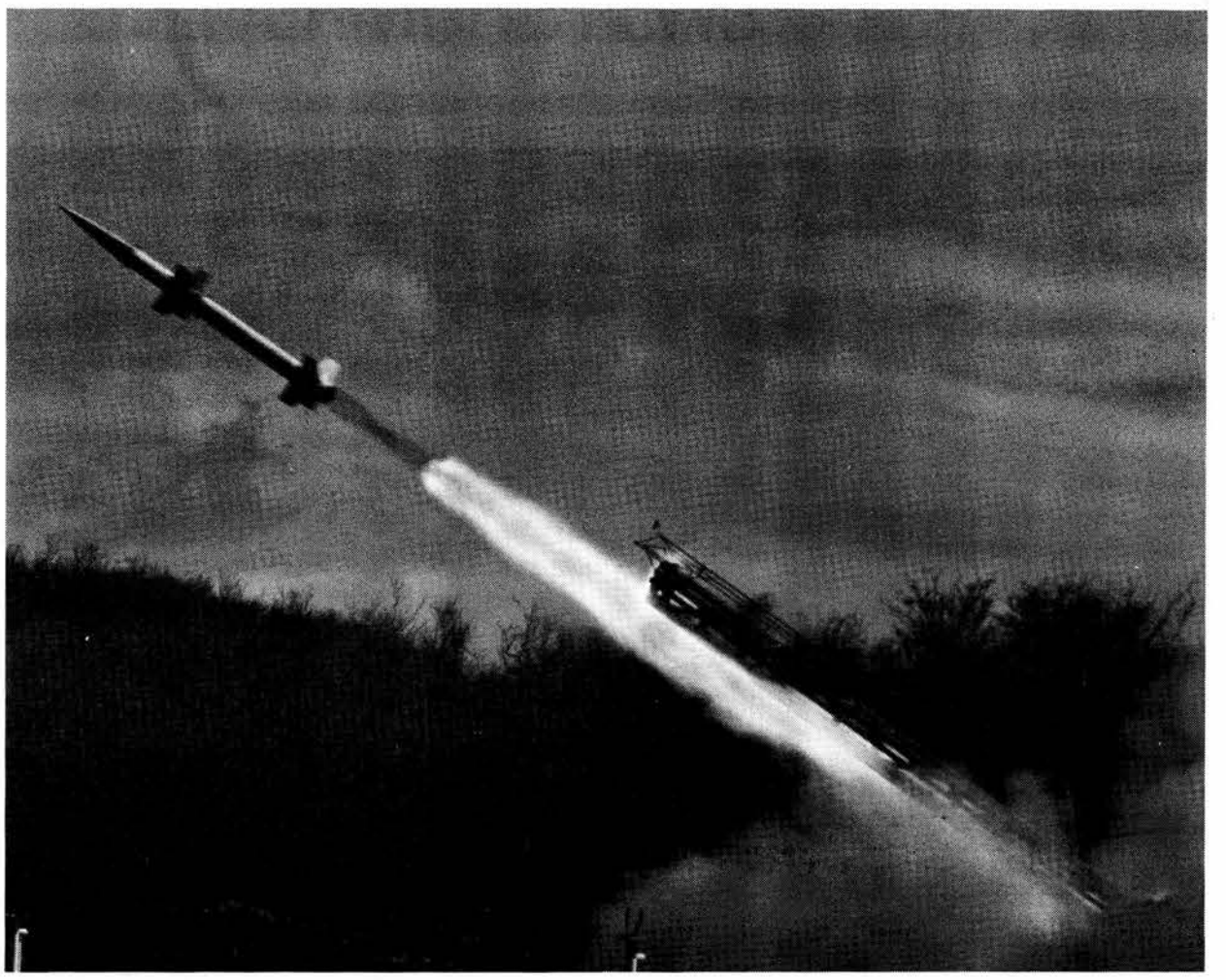
"In addition, our penetrator design should also allow us to use a single body shape for both water and thick ice penetration," Jack explains. "And the shorter time-to-target provided by faster entry may be an important capability for reaching mobile targets.

"This whole program began by bringing together the Sandia earth penetrator work and earlier work involving conical shapes at the Naval Surface Weapon Center [White Oak, Md.] — studies that resulted in a new configuration for stable water entry," Jack continues. "The new pointed nose reduces the initial impact load but still allows the penetrator to remain stable."

Three major areas of work in this program include 1) the design element — built around a realistic payload and carrier system; 2) experimentation — small-scale models and instrumented full-scale units to demonstrate stability; and 3) analysis — looking at the casing, mounting, and loads, as well as cavitation modeling, water entry, and underwater stability (the hydrodynamics work is being done by Randy Maydew's Aerodynamics Department 1550).

The water and ice penetrator program is an adjunct to Sandia's ongoing strategic earth-penetrator program. Using the penetrator technology, researchers are able to improve their understanding of penetration phenomena in a variety of target materials ranging from rock and soil to water and ice.

"We're trying to understand the phenomena involved, with potential application to the development of specific weapons," says Jack. "A penetrator must be able to maintain its stability in water until it reaches its target, and it must be aerodynamically stable because, in most applications, it will be separated from a missile while still in flight."



ROCKET-ASSISTED Anti-Submarine Penetrator leaves launch pad on Kauai for touchdown about 10 miles away in the Barking Sands Tactical Underwater Range.

## Series of Water Tests

According to Michael Ferrario (8152), project leader for the water experiments, penetrator characteristics have been confirmed through an extensive test series that measured impact loads and determined stability for a variety of impact conditions.

More than 150 small-scale tests of the penetrator have been performed at White Oak to study stability. Some of the mockups tested were one-seventh-scale, uninstrumented, inexpensive test models. Twenty-four of the tests involved one-fifth-scale models with telemetry systems to measure impact accelerations. The models were stable at entering angles from 3 to 90 degrees and at velocities as high as 1150 feet per second.

The next step involved nine full-scale tests at Morris Dam in the Naval Ocean Systems Center at Azusa, Calif. This reservoir, part of the Los Angeles Water system, is also a facility for water entry testing and was originally used to test torpedoes and mines. The facility includes two "gun barrels" (launch tubes) of different diameters through which test objects can be launched into the water.

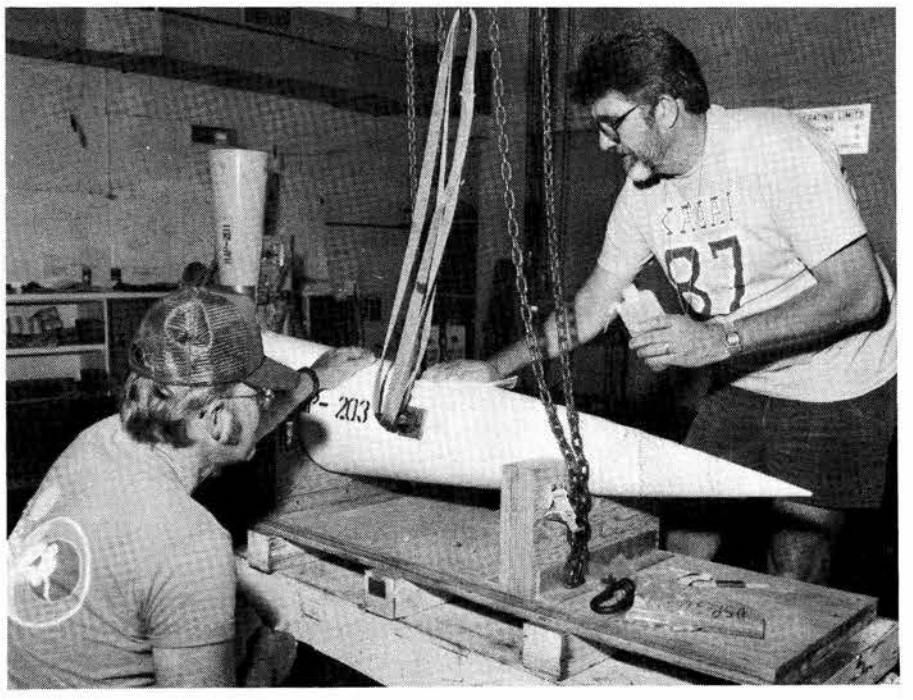
"Morris Dam has two primary advantages — good control of impact conditions and very low cost," says Mike. "In the water, the penetrator pierces a series of nets strung across its expected path. Determining the penetrator's trajectory is a simple matter of measuring where the holes are in relation to a reference point on each net. At Morris Dam we demonstrated successful water entry from 15 to 25 degrees at velocities from 800 to 1150 feet per second."

The following step was eight full-scale tests in ocean water off Kauai. "Working with several other departments [1550, 7170, 7520, 8180, 8240, and 8460], we launched single-stage and two-stage boosters with penetrators aboard out of Sandia's Kauai Test Facility to a point in the Barking Sands Tactical Underwater Range [BARSTUR]," explains Mike.

"One problem we addressed was how to track a body underwater — BARSTUR range is not Morris Dam, so setting up nets wasn't feasible. Well, the range has 37 hydrophones installed in the ocean bottom, which varies from 2400 to 6000 feet deep over a 5-by-10-mile area. So, by installing in each penetrator a 'pinger' [a device that emits coded acoustical signals] developed especially for us at the Naval Oceans System Center, we were able to accurately track each penetrator's underwater trajectory and determine where it came to rest on the bottom.

"Then we lowered an unmanned submersible vehicle, designed for undersea pipeline inspection, to the unit and used the submersible's manipulable arm to hook a rope on the device," Mike continues. "We then pulled it back to the surface with a crane."

The test series demonstrated successful water entry from 20 to 77 degrees and at velocities as high as 2150 feet per second; impact stability was confirmed by gyro and accelerometer records. Attempts to record pressure transients during entry were moderately successful, according to Mike.



JOHN TOOTLE (8182) and Mike Ferrario (8152) work on a penetrator test assembly at Sandia's Kauai Test Facility.

## Arctic Ice Tests

In the spring of 1986 and again this year, a project team conducted a series of more than 80 small-scale and full-scale ice penetration tests with the pointed penetrator. These tests, conducted north of Prudhoe Bay, Alaska, provided a valuable opportunity to compare the results from tests in artificial ice with those in natural Arctic ice (see "Sea Ice Not Simple"), according to Ray Rychnovsky (8152), project leader for the ice experiments.

"The tests we conducted this spring were much more sophisticated," says Ray. "Using an on-board data recorder developed by Ron Franco and Dave

*(Continued on Next Page)*

SANDIA LIVERMORE NEWS

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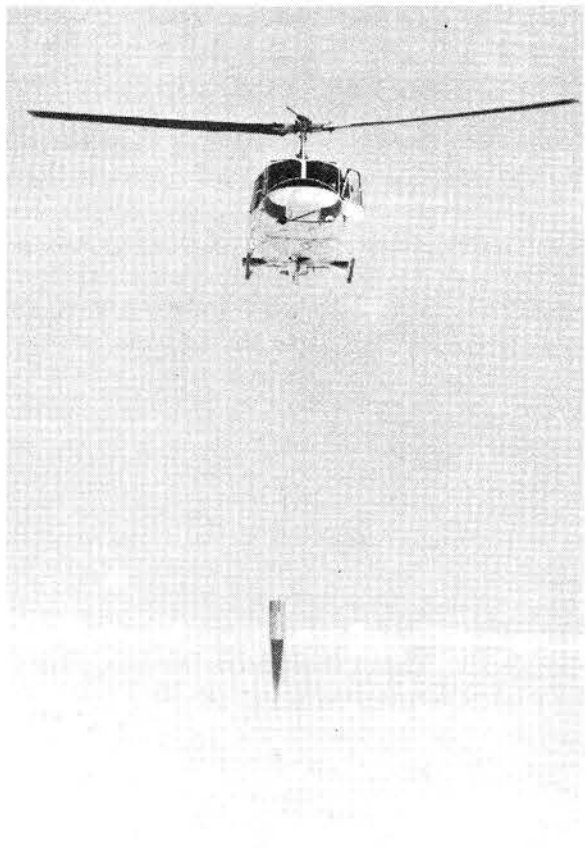
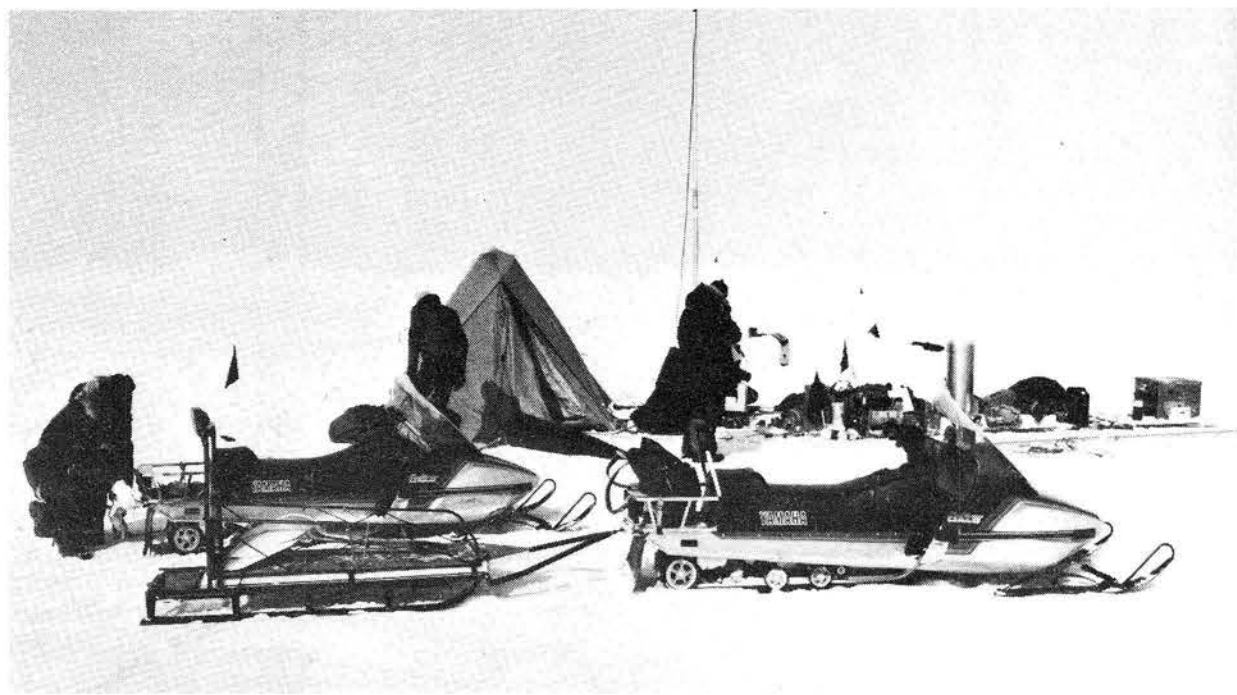


BELL 212 HELICOPTER was one of the ERA aircraft used to carry penetrator units aloft. They were dropped from various altitudes into the Arctic ice pack, barely visible at bottom of photo.



THIS DAY CAMP, on the frozen surface of the Arctic Ocean 38 miles outside Prudhoe Bay, served as a base for daily penetrator drop tests.

***(Continued from Preceding Page)***

# Penetrator

Schultz [both 5144], we measured the axial deceleration and lateral acceleration — the little kick to the side — of both model-size and full-scale penetrators upon impact. Both of these measurements determine the design parameters for onboard components and also guide the structural design — how thick and how strong the case has to be, for example.

''The results were just outstanding — the data recorder worked perfectly,'' he adds.

Each test unit was dropped from an aircraft at altitudes as high as 5000 feet, which resulted in impact velocities as high as 550 feet per second. The tests demonstrated that the units could indeed penetrate saline ice. ''We were fortunate this year,'' Ray notes. ''We were able to work nine days in a row, and that's rare in the Arctic — generally half the time is lost because of extreme weather conditions.

''That's not to say the weather was balmy — one day we had minus 28 degree [F] temperatures plus a 20-mile-per-hour wind, which gave us a minus 60-degree windchill factor,'' Ray recalls. ''But, with our excellent clothing and gear, including face masks, to prevent frostbite, we were still able to work.''

### Analytical Techniques Improved Too

In addition to demonstrating the capabilities of the penetrator in both water and ice, a major objective of the penetrator experiments is to develop and confirm analytical techniques. For example, analysts in the Aerodynamics Department have developed methods for predicting drag and pressure distributions. And Mike Chiesa (8241) has developed codes to predict penetrator and target stresses and to analyze penetration events in great detail. The comparison of analytical with experimental results helped both to guide the experiments and to increase confidence in analytical methods.

The water and ice penetrator program has enhanced the general understanding of penetration phenomena and has helped to develop a new approach to a water entry body with unique advantages over more traditional designs, according to Jack: ''Test results were very encouraging and promise to offer an interesting design option for future weapons.''

IN THE SHELTER of ERA's hangar at Prudhoe Bay, Alaska, the ice penetrator mission group: kneeling in the front row (from left) are Dan Moniz (8182), Ron Franco (5144), Don Goodrich (7137), and Terry Leighly (7137). Second row: Jim Wright (8150), Bob McDonald of ERA Helicopters, Ray Eche (also with ERA), Ray Rychnovsky (8152), Dave Schultz (5144), Sam Brewer of Ross Aviation, Dean Kuehl (7137), Ben Benjamin (ret.), and Betty Carrell (8182). Up high are Mike Chase of ERA, Paul Witcher of Ross Aviation, and Cal Cox (7137). (Photo by Roger Everett, 8151.)

## Sea Ice Not Simple

Saline ice (that is, sea ice) is not as simple in structure as fresh water ice. Sea ice has a columnar structure because the crystals grow in the direction from which heat is removed from the ice. These ice columns, punctuated by brine pockets, cause non-uniform and directional ice strength — they're stronger in the vertical than in the horizontal direction.

Although ice strength is being studied for applications such as ice breakers, these data are not directly applicable to high-speed ice penetration. ''It appears that high-speed penetrators are less sensitive to details of ice structure than are, for example, oil platforms, which collide with ice almost constantly,'' says Jack. ''Although our water/ice penetrator program resulted in a completed penetrator development, precise modeling would require more detailed data on the structure and properties of Arctic ice.

''The data we did gather were vital in the small-scale tests carried out at the hydroballistic facility at the Naval Surface Weapon Center. The ice used there was specially grown to simulate the Arctic columnar formations that we were able to define. But our model of sea ice is really just a first approximation — it certainly met our needs, but, just as certainly, more could be done toward a definitive model of saline ice.''

## *Sympathy*

To Bud Brock (8266) on the death of his father in Livermore, July 16.

***'Feet Across America'***

# Celebrate September — It's Walking Month

Here's the challenge: Walk 5000 miles from Maine's highest point, Mt. Katahdin, to Washington's, Mt. Rainier, during September.

Here's what makes that easy — and fun — even if you've already used up your vacation time: It's a simulated, cumulative walk from coast to coast, with your miles combined with those of other SNLA and DOE walkers.

Easy, fun, "do-able," and healthy — walking improves your physique and your psyche. So TLC's "Feet Across America" is a treat for body and soul — and sole. Eat a fruit and yogurt and walk during lunchtime, or buy an exercise-hungry hound and walk after work, or scuttle your Saab and walk the weekend away. Or do all three.

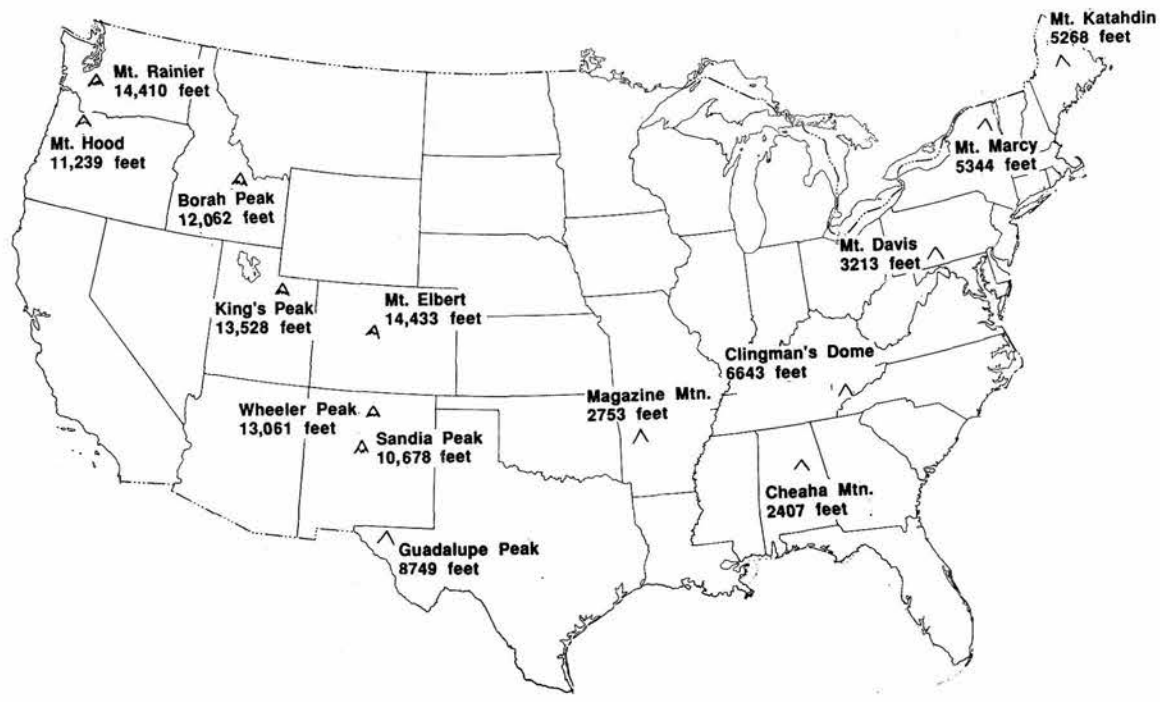
You'll keep a weekly log of your mileage, then turn in your miles for the previous week by noon Mondays to TLC's Kevin Finn (3330). Maps (in the lobbies of the Cafeteria, Bldgs. 802, and 822; in the vending area of Bldg. 880; in the waiting room of Medical, and in T-13) will be updated every Tuesday so you can plot the participants' peak-to-peak progress from Maine to Washington via Albuquerque.

Two special events will kick off the event. Both are by Gene and Audrey Dix of N.M. Walkers and Striders club. One is indoors and focuses on the benefits of walking; the other is outdoors, where walking styles can be properly explained, demonstrated, and practiced.

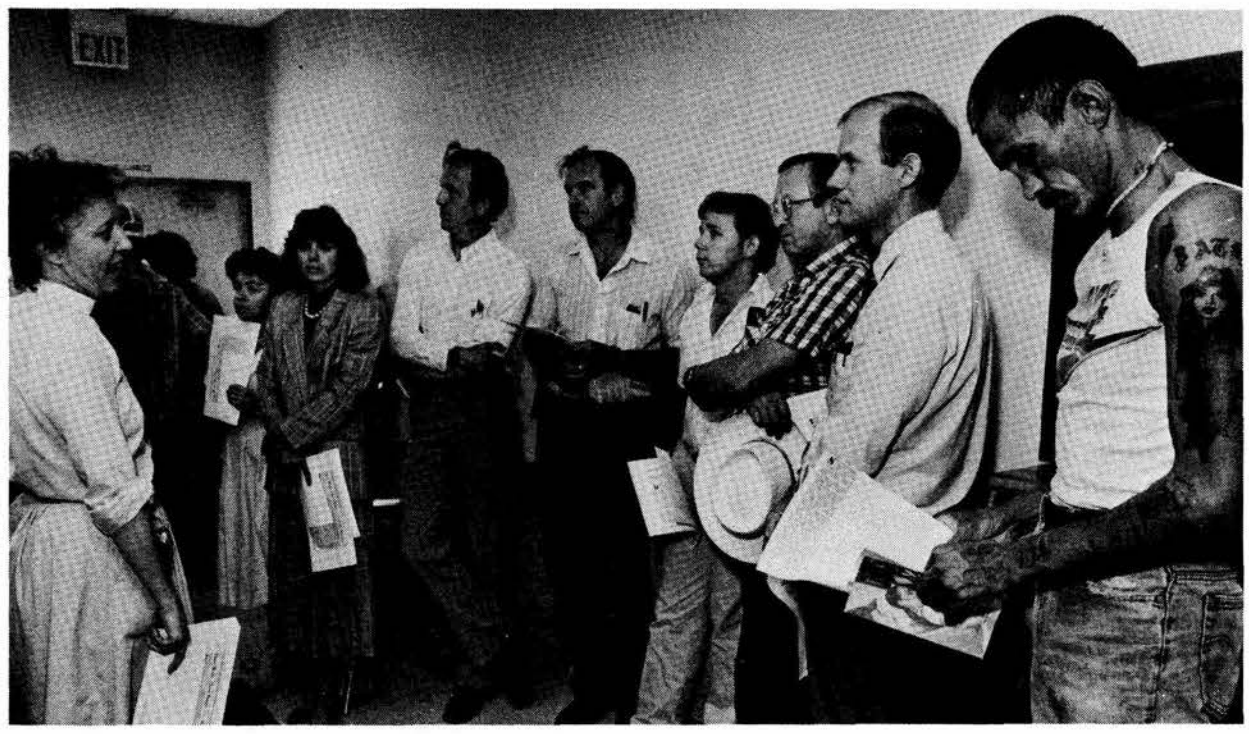
*Date:* Monday, Aug. 31
*Time:* Noon to 12:30
*Place:* Technology Transfer Center
*Topic:* Fitness Walking

*Date:* Tuesday, Sept. 1
*Time:* Noon to 12:30
*Place:* Grassy Area between Bldgs. 383 and 384 at DOE
*Topic:* Demonstration and Pointers on Fitness Walking

Registration packets, which include weekly log and report forms and maps of scenic routes on Base, will be available at both presentations. Or use the registration form on the "Feet Across America" flyer you received this week. Or call the TLC office (4-8238) and request one.




FEET ACROSS AMERICA project will celebrate September, National Walking Month, by challenging Sandians and DOEans to walk — cumulatively and figuratively — from Mt. Katahdin, Maine, to Mt. Rainier, Washington.




WITH SANDIA'S ECP (Employee Contribution Plan) campaign little more than a month away, the Directorate Representatives are gearing up. Here, The Reverend Susan Sager, Director of St. Martin's Hospitality Center, describes to the Sandians the agency's services to Albuquerque's homeless and destitute residents. From left, Jann Levin (3543), Jackie Kerby (3732), Ken Sorenson (6322), David Dobias (7862), Bert Tise (2533), John Clever (2612), and Pace VanDevender (1200); Michael Gurule, a St. Martin's volunteer, is at the right.

PLAQUES AND SMILES marked a recent ceremony in which Troy Wade (second from left), DOE's Deputy Assistant Secretary for Defense Programs, presented commendations for "outstanding efforts in developing the Nuclear Weapon Research, Development, and Testing Five-Year Plan." Holding their awards are (from left) Charlie Winter (ret.), Arlyn Blackwell (400), and Bill Wilson (8230).

***Directorate Challenge, SNLA Style***

## Runners *and* Walkers Welcome at Marathon

The Duke City Marathon on Sept. 27 is really a combination of events — a full marathon, a half marathon, and a 5K event; the latter two are open to both runners and walkers.

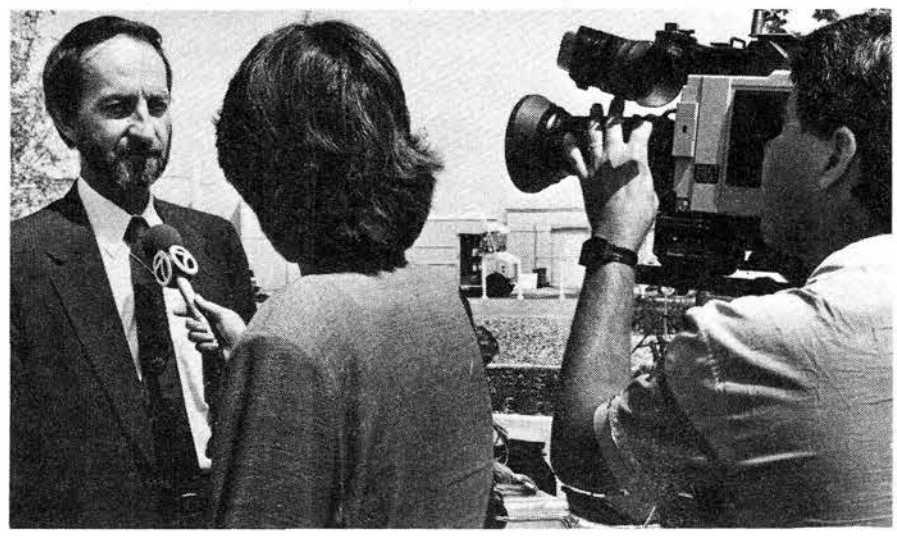
Medical is issuing a challenge to other Sandia directorates: Beat its participation in Duke City Marathon events (in terms of percentage of on-roll employees). That won't necessarily be easy; last year five from 3300 entered the Duke City — Juan Griego, Lisa Dunckel (both 3321), Gwen Gorman (3322), Pete Egan, and Susan Harris, (both 3330). The group was inspired by, if not paced by, women's marathon winner Kate Brennan, a 3330 consultant.

To be counted for your organization, pick up a registration form in the TLC office (Bldg. 831) and leave your name and organization number. After the event, TLC will calculate per capita participation, and the winning directorate will be announced in the Oct. 9 LAB NEWS.

**TLC**
**TOTAL LIFE CONCEPT**


NEAR THE SITE of the Instrumentation Systems Lab, Sandians, guests, and media gathered on Aug. 12 for a ceremony marking the lab's progress toward a late-1989 occupancy. Sandia speakers included President Welber, Orval Jones (20; shown here), and Bob Peurifoy (7000). Other speakers were Senator Jeff Bingaman, Troy Wade (DOE's Deputy Assistant Secretary for Defense Programs), and Ray Romatowski (Director of AL).

BEFORE THE CEREMONY, Orval Jones (20) discussed with Sen. Bingaman the need for the ISL. The new lab will house two major types of organizations — those working with systems for validating the integrity, reliability, and control features on nuclear weapons; and those working with space- and ground-based instrumentation for monitoring and verifying worldwide compliance with nuclear weapon treaties and testing limitations. "These groups need a common facility because they share so much technology," said Orval.



LOCAL TV STATION representatives interviewed Troy Wade, Deputy Assistant Secretary for Defense Programs, at a press conference after the ISL ceremony. Wade has been appointed Assistant Secretary for Defense Programs, the position recently vacated by Admiral Foley, and is awaiting confirmation by the Senate.

**King Chip for Hackers**

At last, a computer game that does not require a computer, cat-like reactions, or earplugs. A British firm called Hardware Dynamics has begun distributing a quiz game called King Chip. The game is similar to Trivial Pursuit, but players have to answer questions on computer matters rather than display an encyclopaedic knowledge of 60s pop music. Although the game has its own board, the makers say it can be played on a Trivial Pursuit board. Clever, eh?

*New Scientist*

SENATOR JEFF BINGAMAN was the guest of honor for the Instrumentation Systems Lab (ISL) ceremony. He later, by remote control, pumped a batch of concrete from a construction crane into its place in the already-under-construction building, which will house some 350 Sandians.

## *Congratulations*

To Halley and Mark (1131) Anderson, a son, Daniel Frederick, July 23.

To Cynthia (3155) Figueroa-McInteer and Bob McInteer, a son, Eric James, July 30.

To Sylvia (2147) and Jeff (1141) Tsao, a son, Evan Jeffrey, Aug. 7.

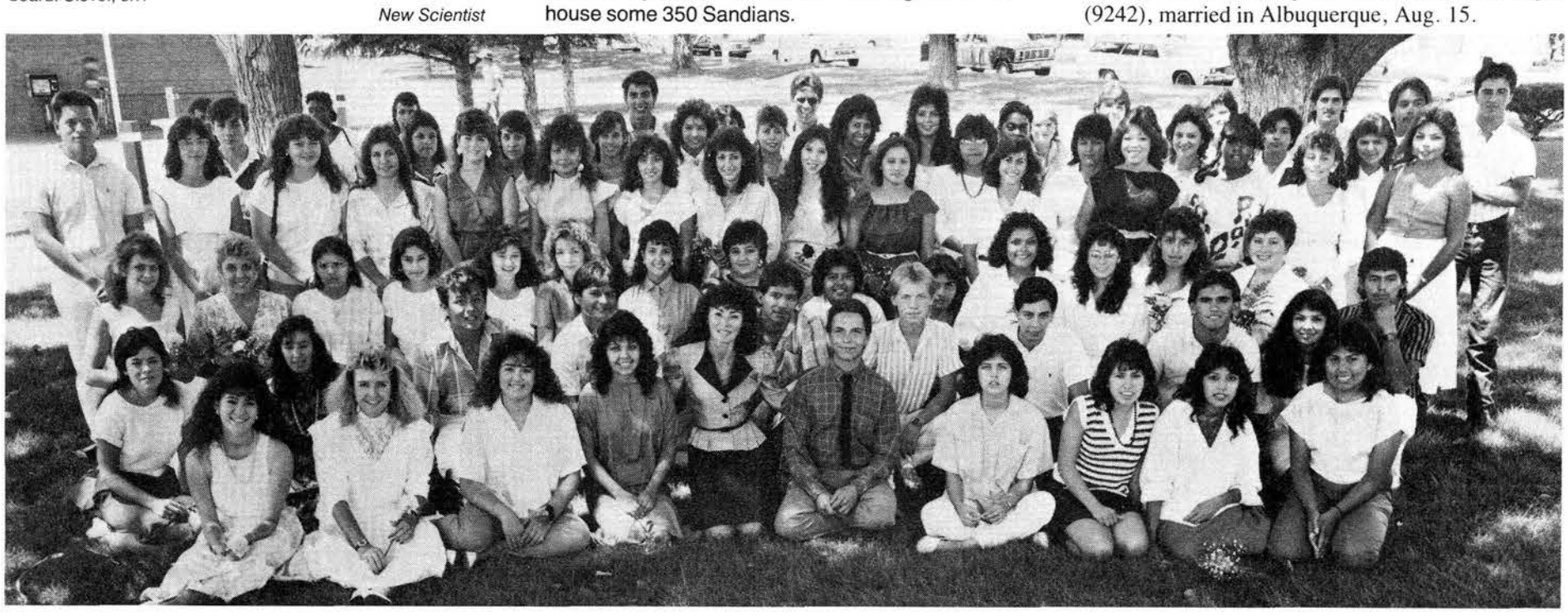
To Jeannie and Mike (9127) Johnson, a daughter, Britta Luanne, Aug. 7.

To Carmela (5253) and Rick Gallegos, a son, Carlton Eric, Aug. 10.

To Vicki (3153) and Jim (7485) Paustian, a daughter, Kari Michele, Aug. 12.

To Debbie and Frank (3735) Lujan, a son, Adriano Charles, Aug. 13.

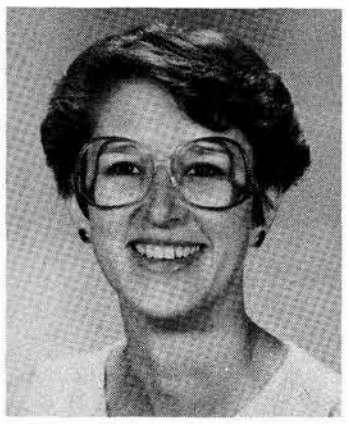
To Barbara Surbey (7831) and Jack Bartberger (9242), married in Albuquerque, Aug. 15.



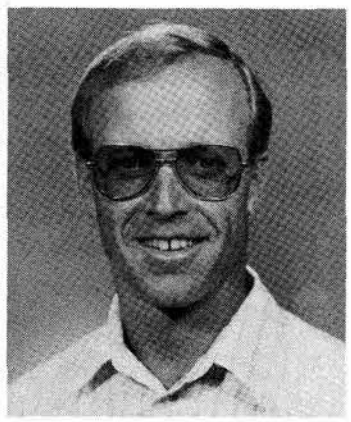
THIS SUMMER'S CROP of YOTs (Youth Opportunity Trainees) plus one — 84 YOTS, including 25 college students, worked at Sandia this summer, and most showed up for this YOT shot. The one non-YOT is program coordinator Soila Brewer (3533; front row, fifth from left). Soila recruits through teachers in local high schools, colleges, and vocational schools. Teachers screen applicants to pick the most capable and deserving students for summer jobs at Sandia.

# MILEPOSTS
## LAB NEWS

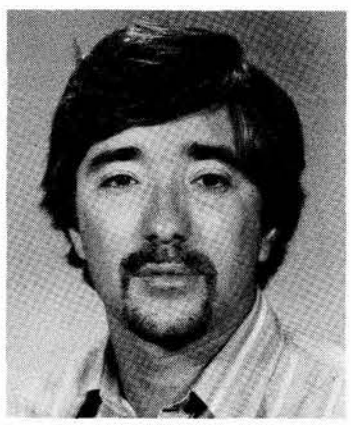
**AUGUST 1987**



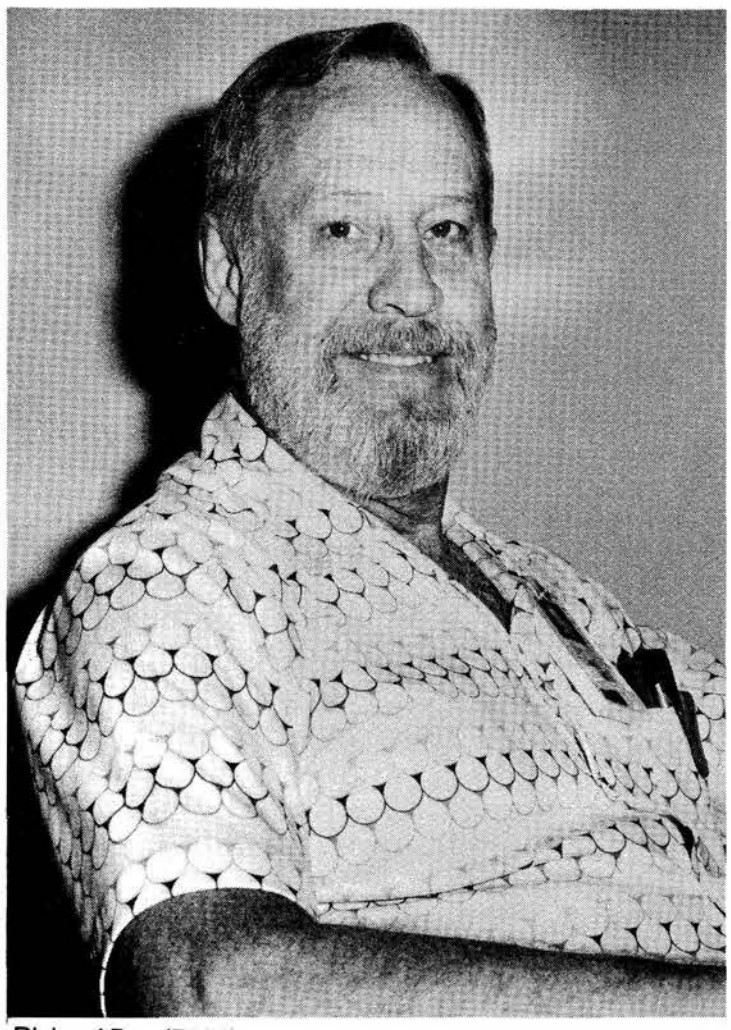
Merri Lewis (1131) 10



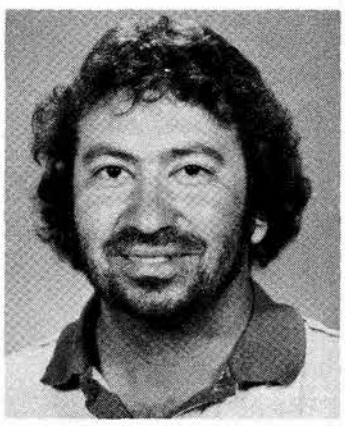
Jack Bartberger (9242) 15



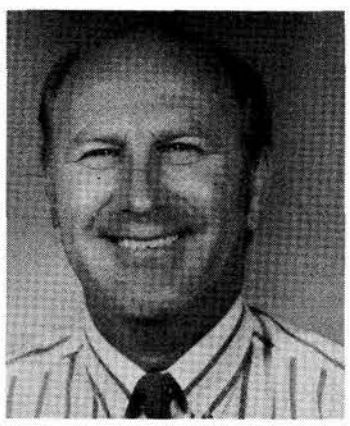
Larry Garcia (3425) 10



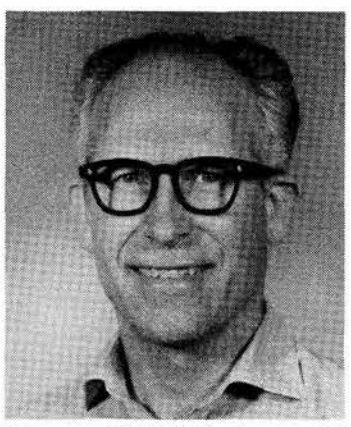
Richard Dye (7131) 30



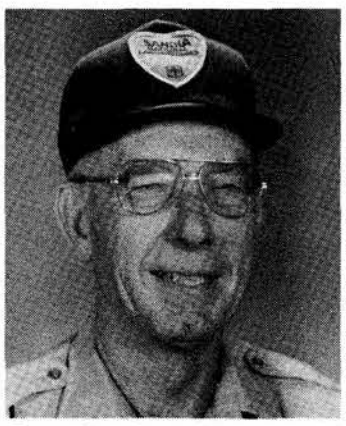
Leroy Garcia (3154) 10



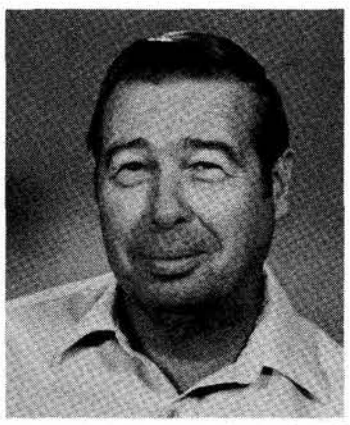
Stan Love (3522) 25



George Clark (2363) 25

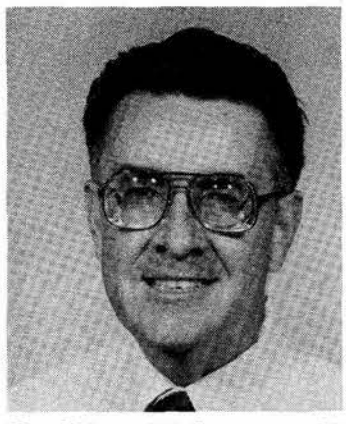


Gene Cox (3434) 30

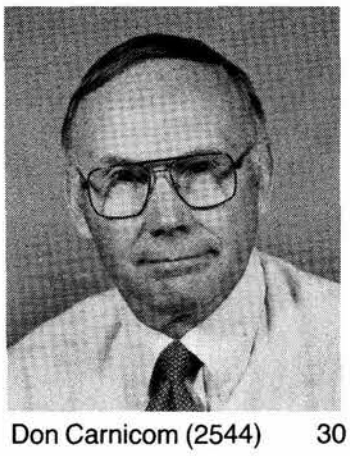


Harlan Richardson (7542) 35

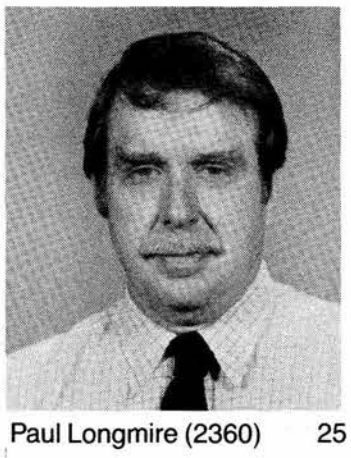
Gloria Turrietta (7252) 10



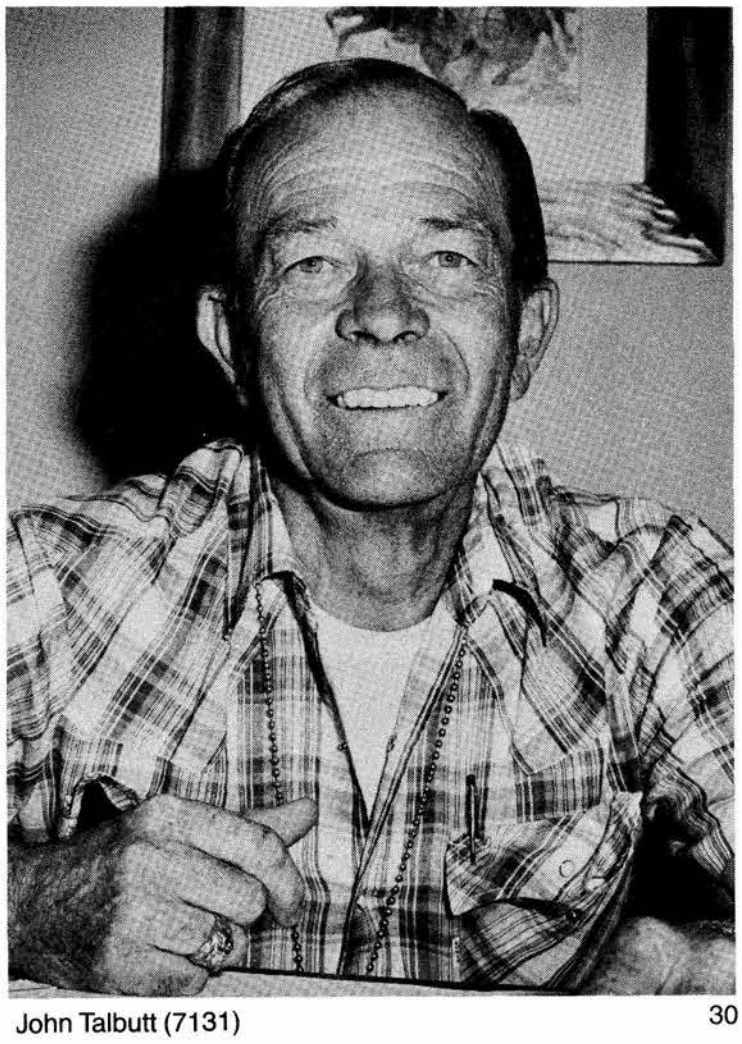
Roy Griego (121) 30



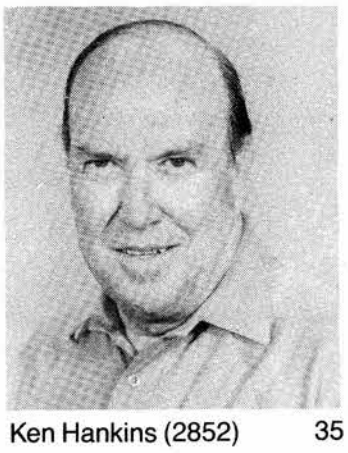
Don Carnicom (2544) 30



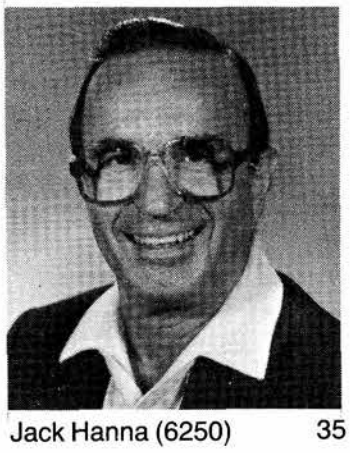
Paul Longmire (2360) 25



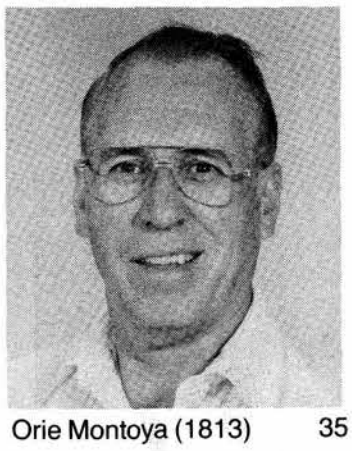
John Talbutt (7131) 30



Ken Hankins (2852) 35



Jack Hanna (6250) 35



Orie Montoya (1813) 35

## MISCELLANEOUS

KENMORE PORTABLE DISHWASHER, $50; love seat and couch, $150; Marquette freezer, $100; Mitchell full cab-over camper, $500. Guay, 281-3891.

FRIGIDARE ELECTRIC STOVE. Vanderburg, 836-1169 after 5:30.

SOFA, light brown/tan with oak trim, 1 year old, $300. Baumgardner, 243-0789.

BASKETBALL HOOP, heavy-duty, without net or backboard, $12. Leeman, 299-9149 after 5:30.

TWO WALNUT END TABLES, $30.00 each; 2 contemporary lamps, $25.00 each; contemporary rug/wall hanging, $50.00; 2 bedroom lamps, $25 each. Witek, 296-5198.

COMPUTER DESK, 33" x 60", handcrafted, red oak, w/top equipment shelves, printer, and file drawers, $1300. Denney, 268-0004.

CARPET, gold, approx. 220 sq. yds., $2 yd. Robb, 821-2999.

KAY CELLO, with bow and case, $500; complete kitchen cabinets, counters, burner, oven, hoods, sink. Anderson, 294-8451.

SWIVEL OFFICE CHAIR, $25; sewing machine with cabinet, $80; 2 area rugs, brown and white, $50 each. Witek, 296-5198.

POOL TABLE, Golden West Billiards, you pick up, $500. Hente, 293-1546.

10" TABLE SAW, Rockwell Delta with stand, 10", extension wings, fence mitre gauge, 1-hp motor, $195. Schneider, 299-6243.

DOUBLE SINK, gold; 4' fluorescent light; kitchen light fixture; 20' long white plastic; four-hole 14" rims. Long, 294-4591.

MIKE SHEA CUSTOM SAILBOARD, 9' 7", $250; 140-litre board $315; small and large harness, $18 and $25; Fanatic sail, $80. Healer, 298-6967.

COVE MOLDING, 3/4", approx. 157 ft., never used, $20. Bailey, 294-4218.

PIANO, mirror top, w/bench, needs repair, $300. Karnowsky, 268-7593 after 7 p.m.

FREE POODLE-COCKER MIX, spayed, has shots and license; small doghouse $20. Guidotti, 884-7594.

AKC DACHSHUND PUPPIES, black; AKC husky puppies, blue eyes. Puccini, 255-0568.

SEVEN STEEL CASEMENT WINDOWS; forced-air furnace; make offers. Arning, 256-9229.

TWO ALUMINUM SCREEN DOORS, std. size, $10 each. Hartley, 299-4233.

RADIO CONTROL AIRPLANE, Falcon 56, with motor and radio, all accessories, ready to fly, $200. Gibson, 344-8056.

CEMENT-COATED NAILS, 50-lb. boxes of #8 and #16, $16 per box. Flores, 298-3211 after 3 p.m.

AUTHENTIC KACHINA DOLLS, handmade, $40 to $50 each. Higgin, 299-3159 or 296-6211 after 6.

PEPSI MACHINE, holds 12-oz. bottles, coin-operated, $50; Gympac 1000 exerciser/weight machine, $100 OBO. Purcell, 296-4986.

TWO CHAIRS, gold fabric, $50 for both; pool table, $100. James, 294-6837.

CABINET STEREO RADIO, 6', dark oak, $75; girl's provincial bookcase-desk, moss green, $100; ivory provincial nightstand, $30. Furman, 298-9264.

DOGHOUSE, home-made, $7; four 165-SR 13 tires, different sizes for all rims, $20; power steering pump for '74 Maverick, 1/3-hp, air conditioner, electric motor; 1/2-ton Ford, for parts, $55. Padilla, 877-2116.

FIREWOOD KINDLING, some small logs, all fruit wood, uncut, free if you haul it. Vargo, 294-8226.

GOODYEAR POWER CUSHION TIRE, mounted on rim, never used, L78-15 polyester core 4-ply tubeless, $35. Hamilton, 881-3089.

IBM CLONE MOTHERBOARD, $50; Sears 90,000-BTU kerosene turbine blower heater with timer, $75. Dionne, 262-0160.

TIRES: 205/60 VR14 Pirelli, approx. 3000 miles, $70; D78-14 Dayton with wheel, new, $25. Konopka, 275-0960 after 9 p.m.

FOUR STATE FAIR RODEO TICKETS, Dwight Yoakam, front-row box seats, Sept. 18, $48. Keener, 294-0856.

MOTORCYCLE HELMET, DOT-approved Bieffe, small (fits teen), $75; child's typewriter, $12. Johnston, 294-5179.

BOWLING SHOES, Lady Dexter, size 7-1/2; Heierling cross-country boots, sizes 35 & 39; first communion dress w/veil, size 6-7. Wagner, 823-9323.

'75 JEEP WAGONEER CHEROKEE PARTS, master cylinder, starter, transfer case chain, clutch, flex fans, gas tank sensor. Smith, 296-3626.

CIRCULAR SAW, Black & Decker 7301, 1-hp motor, two 7-1/4" blades, used on 1 project, $25; '72 Yamaha Enduro motorcycle parts: Allen headcase bolts, bash plate, shift lever, control levers, 1/3 retail. Schkade, 292-5126.

AKC BICHON FRISE, all shots, $200 cash. Spradling, 292-4680.

DOGHOUSE, 30" x 24" x 31", used 1 week, cost $75, sell for $50. Guillen, 291-0177.

POOL TABLE, $75; 20-gal. aquarium w/light, $35. Pilson, 296-0210.

IBM SOFTWARE/HARDWARE, serial/parallel ports, mono display/printer adapters, AST6pack+, Samna3, Multimate, Wordplus PC, tutorial for IBM PC. Klaus, 843-6439.

MIKUNI 27mm RACING CARBURETORS, flat-side smooth bores, fits GPZ550 and others, $225; Eclipse tank-trunk. Barnard, 831-4114.

ADMIRAL UPRIGHT FREEZER, 10.4 cu. ft., 1 yr. old, $100; Hitachi TV, color, 19", 2 yrs. old, $100; Quasar slide/home movie film-to-videotape converter, new, $100. Schmidt, 867-5989.

FILE CABINET, steel, office-quality, 5-drawer, letter-size, $85; weight-lifting bar and retainers, $15. Lehrer, 831-4360.

WEIGHT BENCH and weights. Snelling, 294-5751.

BUILT-IN DISHWASHER, $50; Corning glass cooktop, $25; double steel sink, $10; ductless range hood, $15; all items OBO. VanDeusen, 291-8196.

ANTIQUE DRESSER, walnut, 3-drawer, w/mirror, $200. Schneeberger, 298-5955 evenings.

CONTEMPORARY SOFA, standard size, velvet, cream background/earth-tone print, $160 OBO. Burstein, 821-6688 after 5:30.

ENTRY DOOR, 80" x 36" x 1-3/4", unfinished, solid wood, raised 6-panel design, $70; NordicTrack total-body cardiovascular exercise machine, $425. Lambert, 344-9012.

GUN CABINET, cherry wood, glass front, locked storage, holds 6 rifles, handgun pegs, $75. Tessler, 296-7587.

ELECTRIC STOVE, Frigidaire, double oven (1 self-cleaning), avocado, $50. Robertson, 299-7561.

BABY STROLLER, Strollee 2-seater, w/canopy, $50. Herr, 892-3024.

WEDDING RECEPTION DECORATIONS, pastel rainbow colors, $25. Bartberger, 823-2843.

DRAFTING TABLE, 2' x 3', wood, adjustable height, $20 OBO. Homer, 836-5043.

FREE LANDSCAPING ROCK, approx. 1-3/4" river rock, you haul, 2730 Dallas NE, first come, first serve. Anderson, 883-2647.

TIRES, set of 4, 950 x 16.5, bias, $75. Waite, 867-5953.

PUPPIES: AKC miniature schnauzer, championship bloodlines, family-raised, available Sept. 15, $260. Stoever, 296-3717.

INFANT BICYCLE SEAT, $10; infant car seat, $12. Lente, 869-2958.

DUCK DECOYS, bags and weights included, 29 for $50. Klafke, 869-6877.

DIAMOND CLUSTER RING, 35-point, w/ring guard, 14K gold, $750. Joyce, 293-8976.

OVAL BRAIDED RUG, 8' x 11', brown/cream/black, $75; car seat, $15. Patteson, 836-0140.

FREE TRACTOR TIRE, sandbox. Jackson, 293-0988.

TWO LOVESEATS, 2 conversation chairs, coffee table, stereo cabinet, couch, make offer. Gomez, 256-1584.

ROCKING CHAIR, solid oak, $75. Dunlap, 884-0232.

NEW WASHER & DRYER, Kenmore, $200 less than purchase price. Kraft, 296-2416.

STRATOLOUNGER RECLINER, brown/beige/rust, Herculon fabric, $80. Hawbaker, 292-5418.

ANTIQUE SECRETARY DESK, more than 75 yrs. old, completely refinished mahogany, w/3 shelves behind glass, hidden compartments, more, under appraisal, $1495. Atkins, 298-5762.

RECEIVER, Hammarlund HQ-170A, w/matching speaker; electric chain saw; student desk. Richards, 281-9471.

BRUNSWICK POOL TABLE, 7', slate top, w/matching lamps & accessories, $700; Penney's microwave oven, $175. Gallegos, 839-9048.

BUNK BEDS, $75; king-size bed, $200; D35 Martin guitar, $700; Toro lawn mower, needs work, $75. Stannish, 821-0914.

FURNITURE: solid oak bedroom set, queen, 6 pieces, $650; solid oak coffee table & end table, $175. McKay, 291-8478.

AKC-REGISTERED BOSTON TERRIERS, 5 males, 3 weeks old, $200-$250. Garcia, 898-2605.

ARC WELDER, Lincoln AC, 225-amp. Gomez, 299-5461.

CELLULAR MOBILE PHONE, Motorola, $2200; woman's Lange ski boots, size 8; 4-pc. wicker set, $150; GE dryer, $50. Gonzales, 255-2843.

VIDEO DISPLAY TERMINAL, Zenith Z-29, emulates Zenith H19 (VT52) and ANSI (VT100), $200 OBO. McDonald, 294-9576 after 7.

CONN STUDENT OBOE, $250; Vito student clarinet, w/new ligature mouthpiece and reed case, $250. Owyoung, 294-1884.

COUCH, matching chair, ottoman, 2 bar stools, bar, coffee table, end table, $600 OBO. Vigil, 821-8059.

CAMPER TRAILER, '68 Wheelworld pop-up, sleeps 8, canvas needs work, $295. Claussen, 293-9704.

FRENCH HORN, Conn Single F, $400. Olman, 884-4663.

Because of the Labor Day holiday, the deadline for all ads and other LAB NEWS submissions is noon on Sept. 3.

## TRANSPORTATION

'84 BUICK SKYLARK, AT, PS, PB, AC, EFI, 4-cyl, 30 mpg, 55K miles, white with blue interior, $4000. Danclovic, 869-6086.

'76 RENAULT, $600 OBO. Mora, 873-0592.

'49 DODGE CORONET, $1800 OBO. Sanchez, 831-2645.

'72 DATSUN 510, AT, $200 OBO. Reddy, 299-7597.

'76 OLDS 98, 102K miles, air & radio both need work, $550. Hente, 293-1546.

'79 SUBARU BRAT 4x4, $750 or trade. Gibson, 344-8056.

'80 PHOENIX LJ, 4-dr., loaded, 4-cyl., 106K miles, rebuilt transmission & carburetor, $1500. Puccini, 255-0568.

'87 TOYOTA CELICA ST, 9K miles, AM/FM stereo, AC, $11,000. Lemmon, 296-6991.

'74 Dodge 4x4, 3/4-ton, new brakes, clutch, alternator, and seats, $2500. Pryor, 294-6980 after Mon.

'82 CAPRI 302, 4-spd., AC, tilt, stereo, 39.6K miles, $5200. Chavez, 836-2534.

'82 SUBARU 4x4 GL, 4-dr. SW, 4-spd., 4-cyl., AC, 52K miles, garaged, original owner, $4900. Kallenbach, 293-6916.

10-SPEED BICYCLE, Motobecan Mirage, 19" frame, new 27 x 1.125 tires, $60. Holmes, 292-0898.

BMX BIKE, boy's 21", $35. Hamilton, 881-3089.

GIRLS 10-SPEED BIKE, 26", Free Spirit, $60 OBO. Phelps, 299-3513.

3-SPEED ENGLISH BIKE, includes basket, needs minor repair, free. Burton, 869-2541.

'79 HONDA MOTORCYCLE, 400 Series, 11K miles, $400; '80 Buick Regal, 3.8-litre, AC, AT, PS, AM/FM cassette/stereo, 74K miles, $3000. Atencio, 831-7196.

'87 KAWASAKI ZX750 NINJA, 1K miles, 3 months old, 33 months left on transferable warranty. Turner, 293-8938.

'86 JEEP CJ-7, extras, $11,000. Howell, 292-1994.

'81 CHEV. CITATION X-11, Alpine stereo, extra rims, needs transmission work, $800. Christiansen, 299-8319.

'64 FORD F100, LWB, 12K miles on rebuilt engine, rebuilt AT, new tires, rims, exhaust, radiator, kingpins, $1800. Smith, 892-8633.

'83 BUICK LeSABRE LTD, V-6, loaded, new tires and brakes, cassette/stereo, $4695. Stewart, 293-3959.

'84 CHEVY VAN, newly converted, extras, $11,500. Patrick, 265-4569.

'85 KAWASAKI ELIMINATOR, 908cc, water-cooled engine, shaft drive, 6K miles. Dickenman, 892-9561.

'77 CHEVY PICKUP, 6-cyl., some body damage, $2200 OBO. Bachicha, 865-5413.

'86 FIREBIRD, V-8, AM/FM cassette, PW, cruise, nose mask, $7900. Bassett, 897-4712 or 898-1840.

'86 FORD F-150, PS, PB, AC, 6-cyl., 4-spd., LWB, white. Padilla, 842-8068.

'83 VENTURE ROYAL, 1200cc, fully dressed, 13K miles, all extras, $3500. Jaramillo, 864-2114.

'77 OLDS DELTA 88, original owner, 75K miles, recent carburetor work, $750 OBO. Eldredge, 881-4528.

'72 GRAN TORINO, new tires, no body damage, $650. Berg, 299-8173 or 831-3269.

'78 FORD T-BIRD, AC, AT, $1200 OBO. Phillips, 299-3177.

'70 HONDA STREET BIKE, 450cc, 6K miles on rebuilt engine, new battery, $295. Peterson, 883-8463.

BOY'S 10-SPD. BIKE, $50. James, 294-6837.

'76 CHEV. C-10 PICKUP, 1/2-ton, $1700. Vigil, 869-6870.

'80 OLDS CUTLASS, 4-dr., 260 CID, V-8, AT, AC, 71K miles, $2000. Nord, 298-5259.

'83 SUBARU SW, AT, AC, PW, cruise, new tires, $4450. Lackey, 869-9333.

'84 HONDA 750 INTERCEPTOR, Supertrapp exhaust, sport rack, 11K miles, $2400; '70 Honda CB450 parts. Barnard, 831-4114.

MAN'S BICYCLE, commuter/touring, 21" frame, upgraded components, pump, adult-ridden, $225. VanDeusen, 291-8196.

WOMAN'S 10-SPD. BICYCLE, 20" frame, dual-position brakes, gray, $50. Lambert, 344-9012.

'80 DODGE DIPLOMAT SW, straight 6-cyl., 64K miles, AT, PS, $2700. Herr, 892-3024.

'69 MERCEDES 250, AC, 4-spd., light blue, service records available, $3900; girl's 10-spd. bicycle, Schwinn Collegiate, 18", $60. Edgerly, 898-2983.

'85 TOYOTA CAMRY, 4-dr., 5-spd., AC, PS, cruise, stereo, 17K miles. Cassell, 298-5262.

'77 BLAZER, 4WD, 350 V-8, PS, PB, AC, w/33" tires, $3950; w/stock wheels & tires, $3550. Muirhead, 281-2925.

'72 MGB, silver convertible. Gomez, 256-1584.

'86 MAZDA PICKUP, long bed, AC, cruise, 5-spd., now taking bids, we reserve the right to refuse all bids, all bids subject to prior sale. Sandia Laboratory Federal Credit Union, 844-4555.

'82 CHEV. CAVALIER, cruise, AC, PS, PB. Williams, 1-864-3617.

'81 CHEV. PICKUP, Silverado, AC, AT, PW, PB, PS, diesel, extras. Boverie, 255-1071.

WOMAN'S 10 SPD. BICYCLE, 26", $30. Esterly, 296-9759.

'73 CUTLASS-S, 6K miles on transmission, new battery, radiator, pump, muffler, vinyl top, $795 OBO. Atkins, 298-5762.

'83 TOYOTA CELICA GT, cruise, PS, PB, AC, power sunroof, AM/FM stereo, one owner, $5895. Stannish, 821-0914.

'82 HONDA ODYSSEY, $800 without trailer, $1100 with trailer OBO. Garcia, 898-2605.

'67 VW BUG, original owner, $1500. Hawk, 265-2228.

WOMAN'S BICYCLE, Huffy 10-spd., $40; roof-mounted bicycle rack, $25. Owyoung, 294-1884.

## REAL ESTATE

3-BDR. HOME, corner lot, east of Tramway, between Lomas and Copper, 1-3/4 baths, 1475 sq. ft., 2-car garage, pitched roof, brick front, 9 yrs. old. Hinkel, 298-8226.

2-BDR. HOME, West Side, 900 sq. ft., walled yard, 14-yr. fully assumable FHA 9.5% mortgage. Lewis, 268-5025.

3-BDR. HOME, NE, 1-3/4 baths, 2-car garage, 1630 sq. ft., ceramic floor tile, wood-stain trim, near schools, parks, and bus stops, $92,500. Sepulveda, 299-2805.

3-BDR. HOME, great room, 1350 sq. ft., near Juan Tabo & Copper, 2-car garage w/opener, landscaped, $86,000. Hamilton, 881-3089.

36 ACRES, Juan Tomas Valley, power available, trees, view, $2500 per acre, terms. Baack, 296-2312.

RESIDENTIAL LOT, 85' x 185', 9100 Lona Lane NE, Academy Estates. Alexander, 881-2292.

4-BDR. HOME, 30 mins. so. of Albuq., 2 baths, new carpeting, landscaped, FP, LR, DR, den, 2000 sq. ft., $72,000. Franks, 298-0481 or 864-0567.

4-BDR. HOME, Siesta Hills (SE Heights), pitched roof, all brick, $169,000. Coulter, 294-7256.

3-BDR. HOME, near Juan Tabo and Menaul, 2 baths, double garage, hot tub, 1780 sq. ft., $99,900. King, 299-9184.

3-BDR. MOBILE HOME, '76 Wayside, 14' x 70', wood stove, new carpet throughout, $10,500. Vigil, 869-6870.

4-BDR. HOUSE, Princess Jeanne, 1-3/4 baths, FR, 1540 sq. ft., $72,900 (open house Aug. 30, 1-4 p.m.). Webb, 294-8341.

1-BDR. HOME, Portales, near ENMU, frame stucco, pitched roof, carpet throughout, appliances, $9800 total, $129/mo. PITI. Snelling, 294-5751.

3-BDR. HOME, Four Hills Addition, 1525 sq. ft., view, 1-3/4 baths, DR, 8 yrs. old, lawn, timed sprinklers, cabinets, 3-yr.-old carpet, FP, $89,500. Maxted, 299-4642.

3-BDR. TOWNHOUSE, 2 baths, garage, 1400 sq. ft., central Belen, $62,000, no down. Edmund, 884-3704.

2-BDR. PATIO HOME, study, 2 full baths, 2-car finished garage, FP, established landscaping, NE, 1212 sq. ft., $84,900. Dobranich, 298-4547.

## WANTED

CABOVER CAMPER, 8-8-1/2 ft., with refrigerator, stove top, and heater; prefer good condition. Jones, 281-3617 after 6.

LAWN MOWER, push-type, any size; must be in good working condition; revolver, prefer .22-or .38-caliber, minimum barrel length 4", must be in good condition. Cocain, 836-7127.

REFRIGERATOR, apt.-size, approx. 10 cu. ft.; also trundle bed. Underhill, 294-5774 after 6.

OWNER'S MANUAL, to buy or borrow, for Zenith portable Beta VCR, model VR 9800/VRT 9850. Brandvold, 296-4394.

AQUARIUM, 55-gal. or larger, w/light. Pilson, 296-0210.

HOUSING, for student employee, Sept. 19 through Dec. 20. Boes, 4-5634.

SWIMMING POOL/HOT TUB ACCESSORIES, heater, filter, pump, valves, timer, etc. Anderson, 891-8722.

BABYSITTER, w/own transportation, to sit 2-yr.-old girl once a week, prepare meal, 5:30-8 p.m. Lambert, 294-4188.

EYEPIECES for stereo microscope, standard 23mm OD, 10x, 15x, or 20x, reasonably priced. McDowell, 281-1509.

CRIB, mattress, and sheets, good condition. McBrayer, 293-4076.

COMPUTER PRINTER (Commodore or Centronics interface), as donation to charitable community organization, tax-deductible. Mehlhorn, 823-1437.

HARP. Dalphin, 265-4029.

HOUSEMATE, male or female, share 2-bdr. home, Indian School/Pennsylvania area, $225/mo., 1/2 utilities. Golden, 299-1274 leave message.

## WORK WANTED

HOUSESITTING, by UNM senior (former OSSP), 5 yrs. experience, references. George, 296-0115.

# Don't Labor on Labor Day — Come Out for the Last Splash Bash

GET IN THE SWIM one last time on Monday, Sept. 7, at a pip of a pool party marking the end of another summer splash season. The pool/patio area's open from 11 a.m. to 6 p.m. that day, and you can eat hearty at an a la carte BBQ buffet served from 11 to 5. Your favorite libations — including 50-cent beer — are available at bars set up on the patio. Music played by the Sounds Unlimited DJ gets everybody in a holiday mood, and if that's not enough, all sorts of games and activities throughout the day (with lots of prizes) make this one a memorable family fling. Admission's free for Club members (so bring along your membership card); as usual, guests pay $2. Here's another reason to celebrate: Each person with a summer pool pass gets one free hot dog and a soft drink anytime between 11 and 5!

JAZZ BUFFS JUMP FOR JOY tonight when Angela Simoni and Steve Baca of Dance Studio I take center stage with their sizzling floor show, ''Jazz Le Hot,'' from 7:30 to 8 p.m. Start the evening right with the two-for-one dinner special, featuring prime rib or scallops — your choice of two entrees for $14.95. After Angela and Steve strut their stuff, Michael Ray and Spectrum provide variety music for dancing from 8 to midnight. Don't forget to make that dinner reservation by calling 265-6791.

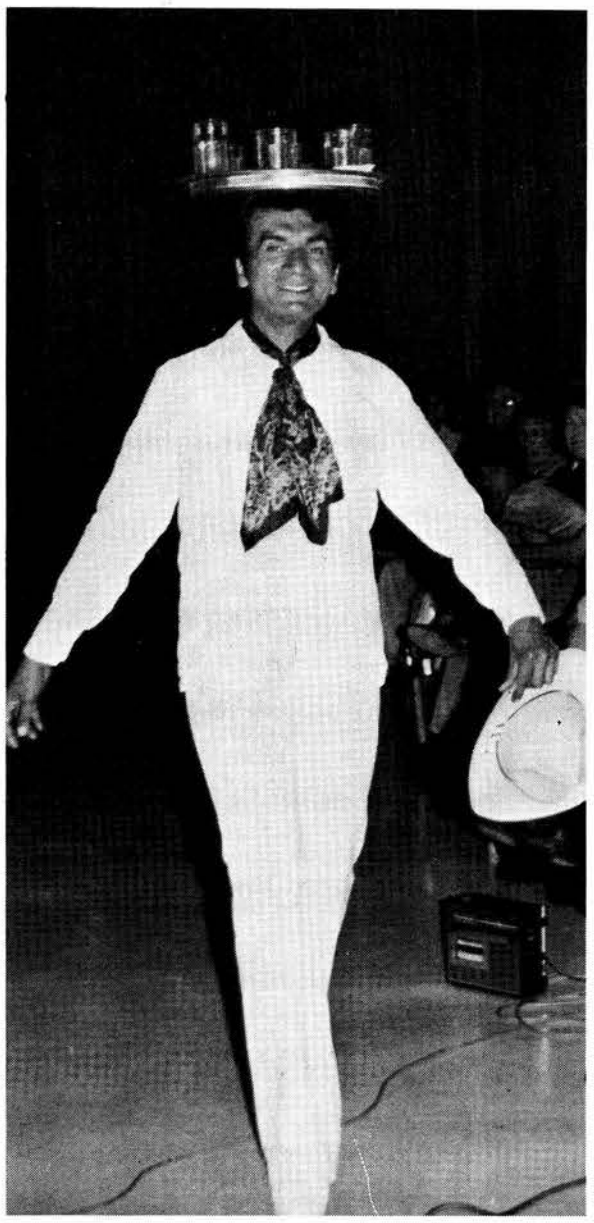
CATCH THE STAGECOACH next Friday night (Sept. 4) for a big country/western hoedown headlining everybody's favorite, the Isleta Poor Boys. As usual on the first Friday of the month, you can polish up your sagebrush-shuffle skills at free dance lessons between 7:30 and 8:30. Afterward, the Isletans strum their special c/w dance tunes from 8:30 to 12:30. The two-for-one chuck wagon offers some elegant fare to get you in the mood ahead of time: filet mignon or poached halibut. (How did the ranch hands find *that* kind of food out on the trail?)

PIZZA + JUGGLERS + FREE SWIMMING = what's in store at the last Family/Variety Night of the summer in the pool/patio area on Saturday, Sept. 5. An alfresco buffet served from 5 to 7 p.m. features fantastic food that every family member will enjoy: pizza, BBQ beef sandwiches, burgers, hot dogs, french fries, ice cream, popcorn, and soft drinks. Entertainment includes an amazing juggling act by Pyros Gyros at 5:30 and VCR cartoons at 6. As usual, there's free swimming from 4 to 8. Don't miss this one; remember, it's back to the ballroom in October!

OUR FAVORITE CARD SHARKS (the T-Birds, of course!) get together for two shuffle-and-deal sessions next month on Sept. 3 and 17. Action starts both days at 10:30 a.m. — a civilized time of the morning if there ever was one. As usual, lots of free goodies are available: refreshments, prizes, and good conversation, to name a few.

PUT AWAY THOSE BARREL STAVES: Here's your chance to find out about the latest in ski equipment and have a heck of a good time to boot. The Coronado Ski Club's annual Ski Fair is set for Tuesday, Sept. 15, starting at 5:30 p.m. at the C-Club patio. All sorts of items will be on display, including attire for the well-dressed schussboomer; you'll also see exhibits featuring ski and resort areas of the region. You needn't be a member of CSC to get in on the festivities, but you can sign up right then and there if you want to — and also reserve your space on some of the fantastic trips planned for the 1987-88 season.

LATIN MUSIC LOVERS — Charming cha-chas and scintillating sambas are on tap two weeks from tonight (Sept. 11). Following the two-for-one special dinner (prime rib or snow crab), Miguel Caro and the Mexican Fiesta Dancers perform from 7:30 to 8:30 p.m. (If you've never seen this group do its authentic regional dances of Mexico, don't miss the show; the dazzling handmade costumes alone are worth the price of admission!) After the floor show, the Freddie Chavez Foundation provides south-of-the-border dance tunes from 8:30 to 12:30. Help out the folks in the C-Club kitchen by calling in that dinner reservation right now.



EVER TRY TO BALANCE a tray holding six glasses of water on top of your head and dance at the same time? It ain't easy — but it's a Miguel Caro specialty, as he demonstrates here. Miguel and the colorfully costumed Mexican Fiesta Dancers present a dazzling show on Latin Night, Sept. 11. Afterward, the Freddie Chavez Foundation plays your favorite south-of-the-border tunes for dancing.

POLITICS AS USUAL? Nope — because this year you not only can vote for C-Club board members at the Annual Meeting on Monday, Sept. 14; you can also cast ballots at the Club from 11:30 a.m. to 1 p.m. weekdays from Sept. 8 through Sept. 14, and from 6 to 8 p.m. on Friday, Sept. 11. The candidate slate includes Alice Maese (132), Mike O'Bryant (2858), Phyllis Padilla (3521), Dick Fairbanks (3521), Mike Robertson (3533), Tim Moss (7243), Frank Gallegos (3428), Ed Neidel (ret.), Jack Mortley (7521), Jeff Kallio (132), Ruben Muniz (155), Anna Bachicha (DOE), and Steve Ross (3438). The Annual Meeting — certainly the most important event of the C-Club year — starts at 5 p.m. in the ballroom. Afterward, plan to stick around for free beer and munchies while you wait for the votes to be tallied.

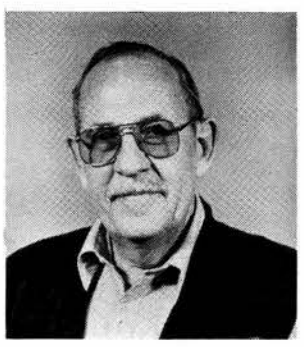
SPEAKING OF ANNUAL MEETINGS, the Thunderbirds are flocking to theirs on Tuesday, Sept. 15, from 2 to 4 p.m. in the ballroom. The Birds will elect officers for the coming year, so it's important to be there if you're a member, says honcho Charlie Kaspar. Also welcome are retirees who may be interested in joining this spirited group. Psst! Those who show up not only find some fine fellowship; they also feast on free hors d'oeuvres. Don't say we didn't tell you.

YOU WON'T BE DART-BORED if you join the C-Club Dart League for good times in the pub (sometimes known as the lounge). This happy group goes for bull's-eyes every Tuesday night starting at 4:30 and, for the most part, the folks are right on target. The Fall League begins Sept. 15, so plan to get in on the action.

BIG FLICK DISCOUNTS are available to Club members. Stop in at the office and purchase discount movie tickets, good anytime, at UA Cinema, General Cinema, or Commonwealth theatres. Cost is $2.50 for Commonwealth, $3 for UA, and $3 for General Cinema. Don't tell *us* you haven't heard of any good bargains lately . . .

CLOSET VAGABOND? The Travel Committee is looking for two or three new members to fill slots left open because of recent resignations. The job involves planning trips and working with travel agencies on arrangements. If you're interested or would like more info, call Marlene Smith on 4-2837.

## Death



Neal Rozell of Mechanical Utility Systems and Central Steam Plant Section 7811-2 died suddenly Aug. 17. He was 59 years old.

He had been at Sandia since January 1952. He is survived by his wife and two daughters.

## Take Note

Three Sandians have been selected to serve a second term as officers of the Albuquerque section of the American Society for Quality Control for 1987-1988: Robert Richards (6310), section chairperson; Max Littleton (7263), vice-chairperson; and John Nagel (7222), secretary. Samuel Torres (DOE/AL/QA) was chosen treasurer.

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Julia Gabaldon (3523) will be a local co-host of the Jerry Lewis Muscular Dystrophy Labor Day Telethon Sept. 6 & 7 on Channel 13. Julia is also the host of the 8 a.m. Sunday TV program, ''Nuevo Mexico USA,'' on Channel 7 beginning Sept. 6.

* * *

Mike Cisneros, president of LANL Technicians Affiliate Association (TAA) of the American Chemical Society, will be at Sandia's first organizational meeting of the TAA on Sept. 10 from 5-6 p.m. at the Coronado Club. All interested technicians are invited. Refreshments will be served. For more information, call Ralph Tissot (1822) on 4-5671.

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The theme of the 1987 NM Audubon Conference Oct. 17 & 18 is ''Habitat Endangerment: Present and Potential.'' The Conference will be held in Santa Fe at the Sheraton Santa Fe Inn; check-in at 9:30 a.m. A field trip to Randall Davey Audubon Center on Upper Canyon Road is Oct. 18. Speakers and topics include: Carl Couret, U.S. Fish and Wildlife Service, ''The Gila & the Bosques''; Dutch Salmon, writer and member of the Interstate Stream Commission, ''San Francisco River''; and Roger Peterson, St. John's College, ''Grasslands.'' Registration forms are available in the LAB NEWS office (Bldg. 814). For more information, contact Lillian Tenopyr on 892-4879.